



FIG. 1

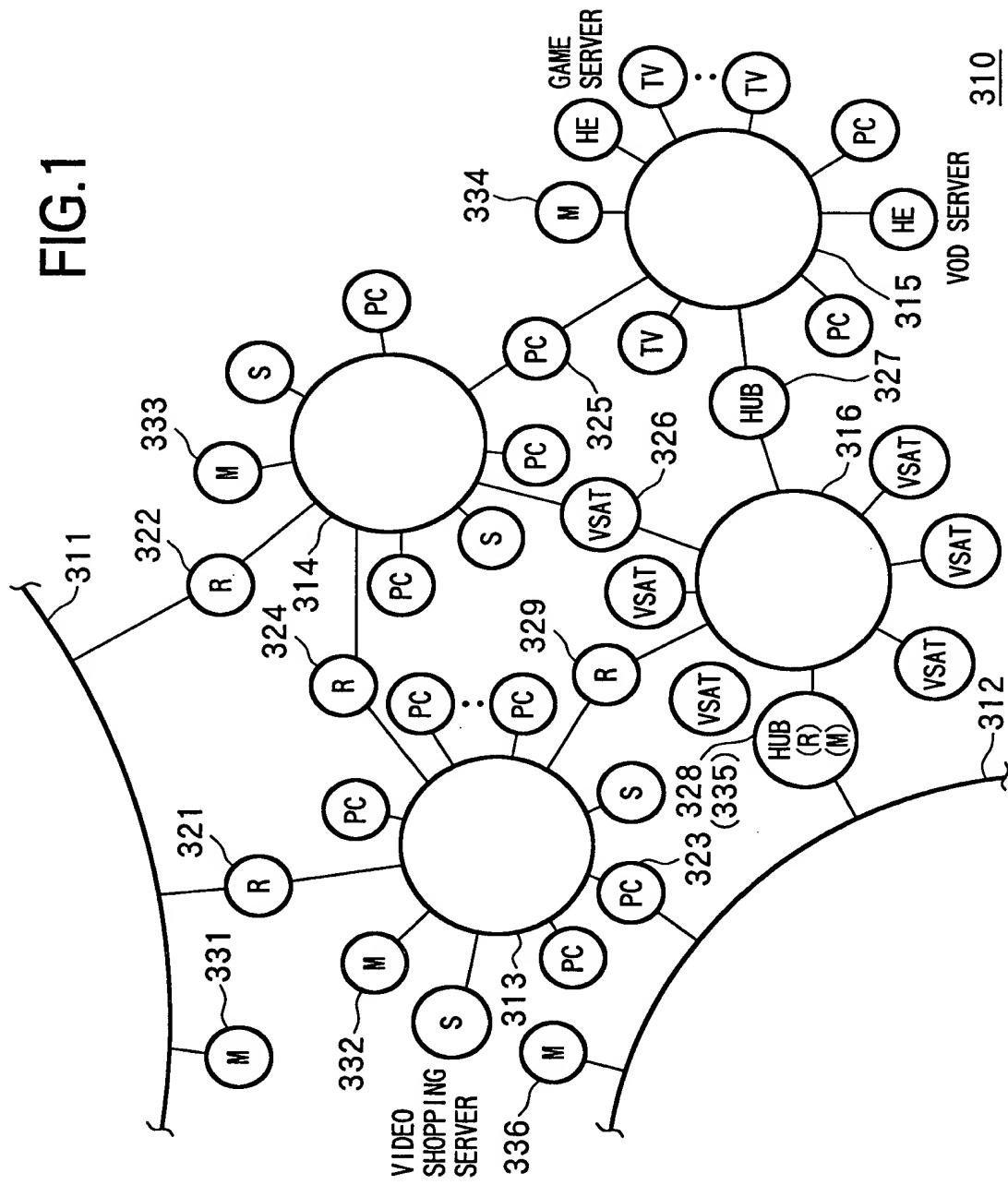
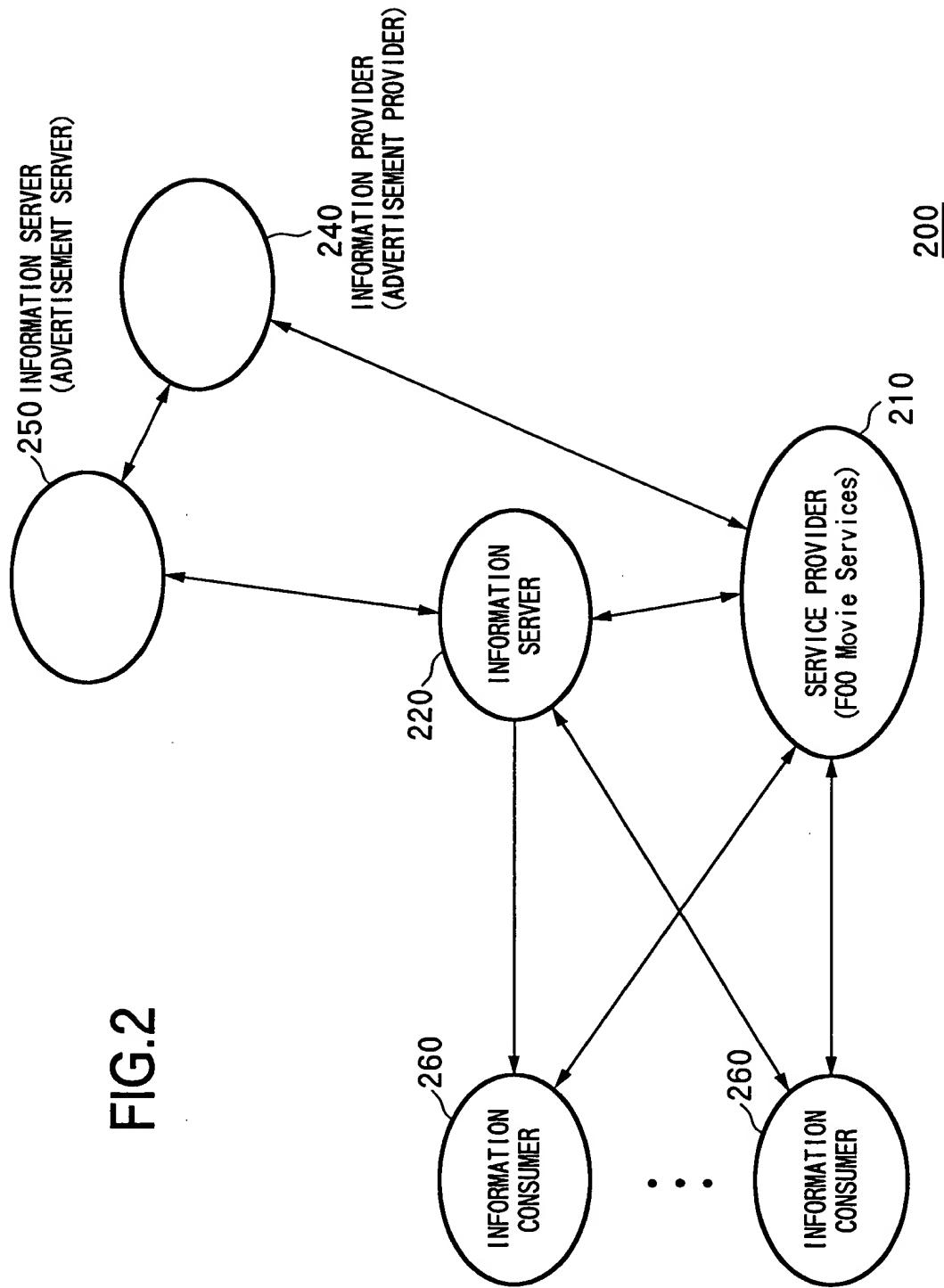




FIG.2



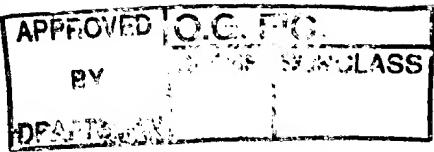


FIG.3

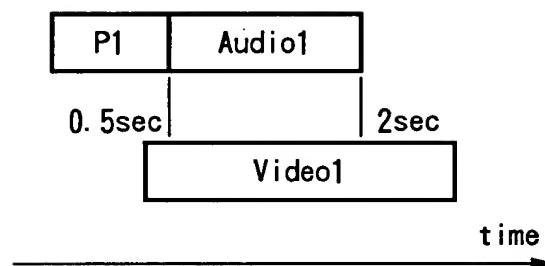
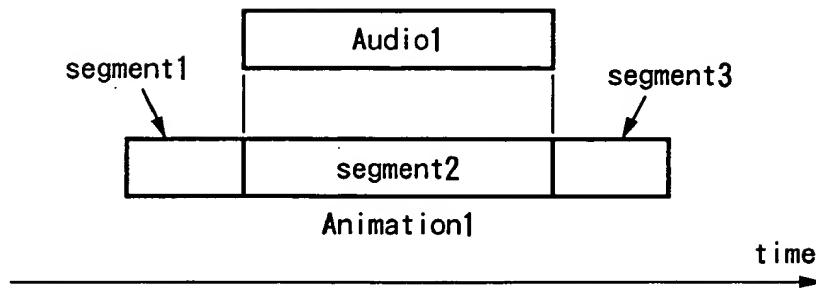
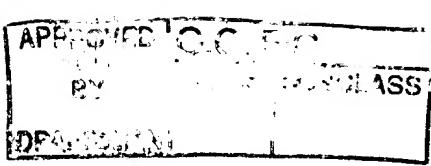


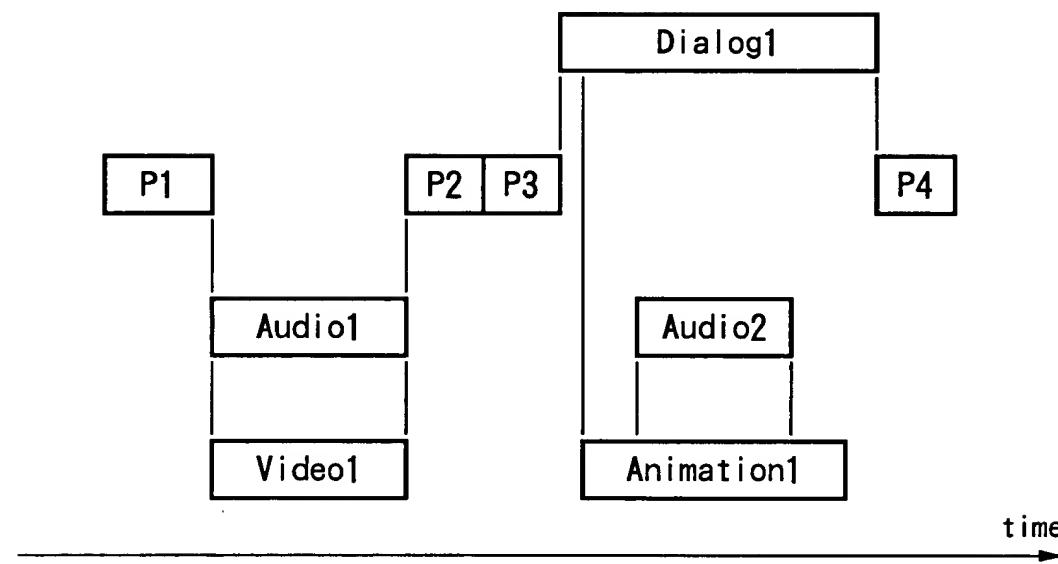
FIG.4





கனம் கொண்டு வருவதற்காக நடவடிக்கை

FIG.5



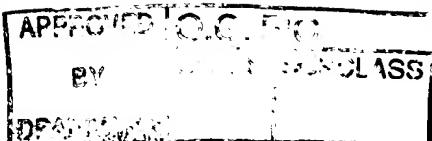


FIG.6A

```
<!ENTITY picture1
  <picture hsize=300 vsize=200 color=256>
    <source> <local-link> picture-link1 </local-link> </source>
  </picture>>
<!ENTITY picture2
  <picture hsize=300 vsize=200 color=256>
    <source> <local-link> picture-link2 </local-link> </source>
  </picture>>
<!ENTITY picture3
  <picture hsize=300 vsize=200 color=256>
    <source> <local-link> picture-link3 </local-link> </source>
  </picture>>
<!ENTITY picture4
  <picture hsize=300 vsize=200 color=256>
    <source> <local-link> picture-link4 </local-link> </source>
  </picture>>
```

FIG.6B

```
<!ENTITY audio1
  <audio sampling-size=16>
    <source> <local-link> audio-link1 </local-link> </source>
  </audio>>
<!ENTITY audio2
  <audio sampling-size=16>
    <source> <local-link> audio-link2 </local-link> </source>
  </audio>>
```



FIG.7A

```
<!ENTITY video1
  <video hsize=450 vsize=300 color=16 frame-rate=30>
    <source> <local-link> video-link1 </local-link> </source>
  </video>>
```

FIG.7B

```
<!ENTITY animation1
  <animation hsize=400 vsize=300 color=8 frame-rate=15>
    <source> <local-link> animation-link1 </local-link> </source>
    <segment begin=0 end=70> segment1 </segment>
    <segment begin=70 end=100> segment2 </segment>
    <segment begin=100> segment3 </segment>
  </animation>>
```

FIG.7C

```
<!ENTITY dialog1
  <dialog>
    <title> Movie Search </title>
    Search for <input type=text size=45> pattern </input>
    Joined by:<input type=radio value="AND">value="OR">
      bool</input>
    Partial Match:<input type=radio value="Yes">value="No">
      match</input>
    <input type=action value="Search"> search </input>
    <action> search
      <local-link> server-action-link1 </local-link>
      bool match <action>
    </dialog>
```

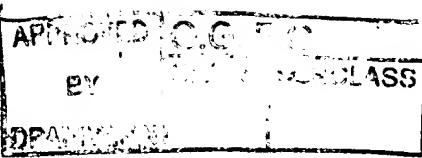


FIG.8A

```
<!ENTITY viewer1  
<viewer min-hsize=440 min-vsize=330> </viewer>>
```

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FIG.8B

```
<open-window> & viewer1 </open-window>  
<before delay=0 max-skew=500 duration=3> & picture1 & audio1 </before>  
<while delay1=0 delay2=0 max-skew=80> & audio1 & video1 </while>  
<before delay=0 max-skew=500> & audio1 & picture2 </before>  
<before delay=0 max-skew=500 duration=2> & picture2 & picture3 </before>  
<before delay=0 max-skew=500 duration=2> & picture3 & dialog1 </before>  
<while delay1=0.5 delay2=2 max-skew=120> & animation1 & dialog1 </while>  
<while delay1=0 delay2=0 max-skew=80>  
    & audio2  
    <sequence segment=segment2> & animation1 </sequence>  
  </while>  
<before delay=0 max-skew=500> & dialog1 & picture4 </before>
```



FIG.9

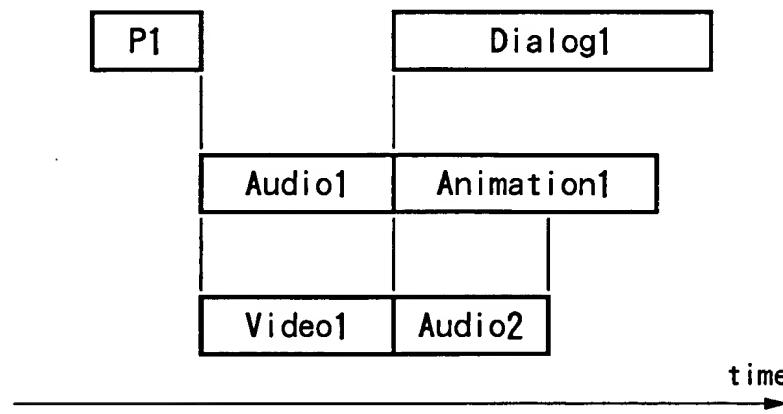
Movie Search

Search for

Joined by: AND OR

Partial Match: Yes No

FIG.10



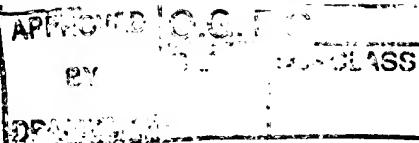


FIG.11

FOO Movie Services

Please Select Movie Title

Star Wars

USA 1977:Science Fiction PG 121 min. Maltin:***
Director:George Lucas
Starring:Mark Hamill, Harrison Ford, Carrie Fisher

Empire Strikes Back

USA 1980:Science Fiction PG 124 min. Maltin:***
Director:Irvin Kershner
Starring:Mark Hamill, Harrison Ford, Carrie Fisher

Return of the Jedi

USA 1983:Science Fiction PG 133 min. Maltin:***
Director:Richard Marquand
Starring:Mark Hamill, Harrison Ford, Carrie Fisher

The Ten Commandments

USA 1956:Religious NR 220 min. Maltin:***
Director:Cecil B. De Mille
Starring:Charlton Heston, Yul Brynner

Kagemusha

Japan 1980:Drama/War PG 159 min. Maltin:***
Director:Akira Kurosawa
Starring:Tatsuya Nakadai

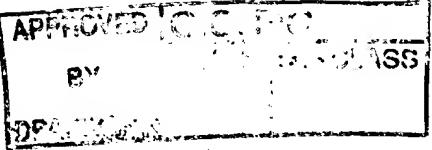


FIG.12

```
<package>
<title format=DWL version=2.0>
  <cover format/jpeg> & cover-description </cover>
  <name>"F00 Movie Services:MOVIE TITLES" </name>
  <sort> CONTENT <minor-sort> CATALOG </minor-sort> </sort>
  <system> PACKAGE-PROCESSOR </system>
  <structure> <linkage> <local-link> & linkage-part </local-link> </linkage>
    <content-attributes> <local-link> & content-attribute-part </local-link>
      </content-attributes>
    <control-attributes> <local-link> & control-attribute-part </local-link>
      </control-attributes>
    <sequences> <local-link> & sequence-part </local-link> </sequences>
      </structure>
    <ENTITY cover-description {jpeg data body}>
  </title>
```

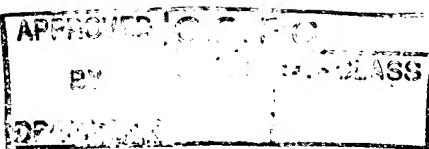


FIG.13

```
<!ENTITY linkage-part
<linkage>
  <link boundary=internal> <label> picture-link1 </label>
    net-resource://picture-server/picture11 </link>
  <link boundary=internal> <label> audio-link1 </label>
    net-resource://audio-server/audio11 </link>
  <link boundary=internal> <label> audio-link2 </label>
    net-resource://audio-server/audio12 </link>
  <link boundary=internal> <label> video-link1 </label>
    net-resource://video-server/video11 </link>
  <link boundary=internal> <label> animation-link1 </label>
    net-resource://animation-server/animation11 </link>
  <link boundary=external> <label> package-link2 </label>
    net-resource://package-server/package2
    <content>
      <type> movie </type>
      <provider> FOO Movie Services </provider>
    </content>
    <control> admission-required <control>
  </link>
  <link boundary=external> <label> package-link3 </label>
    net-resource://package-server/package3
    <content>
      <type> movie </type>
      <provider> FOO Movie Services </provider>
    </content>
    <control> admission-required <control>
  </link>
```



FIG.14

```
<link boundary=external> <label> package-link4 </label>
    net-resource://package-sever/package4
    <content>
        <type> movie </type>
        <provider> FOO Movie Services </provider>
    </content>
    <control> admission-required <control>
</link>
<link boundary=external> <label> package-link5 </label>
    net-resource://package-sever/package5
    <content>
        <type> movie </type>
        <provider> FOO Movie Services </provider>
    </content>
    <control> admission-required <control>
</link>
<link boundary=external> <label> package-link6 </label>
    net-resource://package-sever/package6
    <content>
        <type> movie </type>
        <provider> FOO Movie Services </provider>
    </content>
    <control> admission-required <control>
</link>
</linkage>
```

FIG.15

```
<!ENTITY content-attribute-part
  <content-attributes>
    <type> catalog </type>
    <provider> FOO Movie Services </provider>
    <release> July 1997 edition </release>
    <data> 1 July 1997 </data>
    <items> 5 </items>
  </content-attributes>>

<!ENTITY control-attribute-part
  <control-attributes>
    <billing> free </billing>
    <execution-environment>
      <user-unit-requirement>
        <memory-space> 2 </memory-space>
        <graphics> 640×480×16 </graphics>
        <audio> 16 </audio>
      </user-unit-requirement>
    </execution-environment>
    <encryption scheme="RSA key-sort=open"> #87654321098765 </encryption>
  </control-attributes>
```

FIG.16

```
<!ENTITY sequence-part
  <sequences>

    <!ENTITY picture1
      <picture hsize=300 vsize=200 color=256>
        <source> <local-link> picture-link1 </local-link> </source>
      </picture>>

    <!ENTITY audio1
      <audio sampling-size=16>
        <source> <local-link> audio-link1 </local-link> </source>
      </audio>>

    <!ENTITY audio2
      <audio sampling-size=16>
        <source> <local-link> audio-link2 </local-link> </source>
      </audio>>

    <!ENTITY video1
      <video hsize=450 visize=300 color=16 frame-rate=30>
        <source> <local-link> video-link1 </local-link> </source>
      </video>>

    <!ENTITY animation1
      < animation hsize=400 vsize=300 color=8 frame-rate=15>
        <source> <local-link> animation-link1 </local-link> </source>
      </animation>>

    <!ENTITY dialog1

      CONTENTS OF THE DIALOG1

    <!ENTITY viewer1
      <viewer min-hsize=440 min-vsize=330> </viewer>>

    <open-window> & viewer1 </open-window>
    <before delay=0 max-skew=500 duration=2> & picture1 & audio1 </before>
    <while delay1=0 delay2=0 max-skew=80> & audio1 & video1 </while>
    <before delay=0 max-skew=500> & audio1 & dialog1 </before>
    <cobegin delay=0 max-skew=120> & animational & dialog1 </cobegin>
    <while delay1=0 delay2=0 max-skew=80> & audio2 & animation1 </while>
  </sequences>>
</package>>
```

FIG.17

<dialog>

<title> FOO Movie Services </title>

Please Select Movie Title

<action> take <local-link> package-link2 </local-link>

"Star Wars"

</action>

USA 1977:Science Fiction PG 121 min. Maltin:***

Director:George Lucas

Starring:Mark Hamill, Harrison Ford, Carrie Fisher

<action> take <local-link> package-link3 </local-link>

"Empire Strikes Back"

</action>

USA 1980:Science Fiction PG 124 min. Maltin:***

Director:Irvin Kershner

Starring:Mark Hamill, Harrison Ford, Carrie Fisher

<action> take <local-link> package-link4 </local-link>

"Return of the Jedi"

</action>

USA 1983:Science Fiction PG 133 min. Maltin:***

Director:Richard Marquand

Starring:Mark Hamill, Harrison Ford, Carrie Fisher

<action> take <local-link> package-link5 </local-link>

"The Ten Commandments"

</action>

USA 1956:Religious NR 220 min. Maltin:***

Director:Cecil B. De Mille </list>

Starring:Charlton Heston, Yul Brynner

<action> take <local-link> package-link6 </local-link>

"Kagemusha"

</action>

Japan 1980:Drama/War PG 159 min. Maltin:***

Director:Akira Kurosawa

Starring:Tatsuya Nakadai

</dialog>

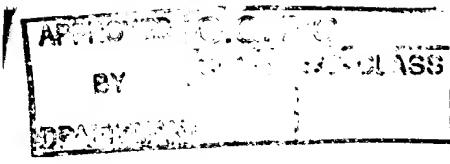


FIG.18

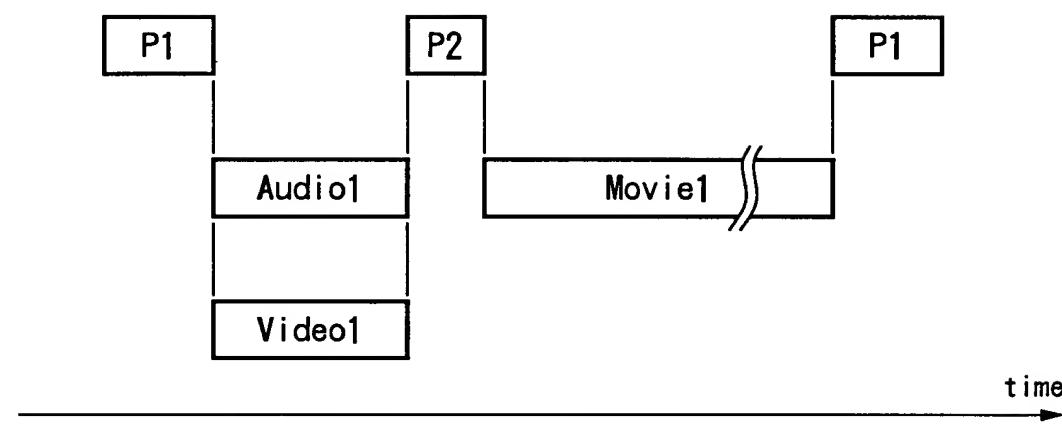


FIG.19

```
<package>
  <title format=DVL version=2.0>
    <cover format/jpeg> & cover-description </cover>
    <name>"FOO Movie Services:Star Wars" </name>
    <sort> CONTENT <minor-sort> MOVIE </minor-sort> </sort>
    <system> PACKAGE-PROCESSOR </system>
    <structure> <linkage> <local-link> & linkage-part </local-link> <linkage>
      <content-attributes> <local-link> & content-attribute-part </local-link>
        </content-attributes>
      <control-attributes> <local-link> & control-attribute-part </local-link>
        </control-attributes>
      <sequences> <local-link> & sequence-part </local-link> </sequences>
    </structure>
    <!ENTITY cover-description {jpeg data body}>
  </title>
  <!ENTITY linkage-part
  <linkage>
    <link boundary=internal> <label> picture-link1 </label>
      net-resource://picture-server/picture21 </link>
    <link boundary=internal> <label> picture-link2 </label>
      net-resource://picture-server/picture22 </link>
    <link boundary=internal> <label> audio-link1 </label>
      net-resource://audio-server/audio21 </link>
    <link boundary=internal> <label> video-link1 </label>
      net-resource://video-server/video21 </link>
    <link boundary=internal> <label> movie-link1 </label>
      net-resource://movie-server/movie21 </link>
  </linkage>>
```

FIG.20

```
<!ENTITY content-attribute-part
  <content-attributes>
    <type> movie </type>
    <provider> FOO Movie Services </provider>
    <data> 1 July 1997 </data>
    <items> 1 </items>
    <material format=MPEG2> MOVIE </material>
    <content>
      <title> Star Wars </title>
      <type> Science Fiction </type>
      <producer> Gary Kurtz </producer>
      <director> George Lucas </director>
      <composer> John Williams </composer>
      <starring> Mark Hamill </starring>
      <starring> Harrison Ford
        <occupation> Actor </occupation>
        <born> July 13, 1942, Chicago, IL, USA </born>
        <education> Ripon College, WI, USA </education>
      </starring>
      <starring> Carrie Fisher </starring>
      <color> color </color>
      <length unit=minute> 121 </length>
      <year> 1977 </year>
      <country> USA </country>
      <language> English </language>
      <rating authority=MPAA> PG </rating>
      <review reviewer=Leonard Maltin> *** </review>
      <review reviewer=Baseline's Motion Picture Guide> **** </review>
      <award authority=Academy> Art Direction/Set Decoration 1977 </award>
      <award authority=Academy> Costume Design 1977 </award>
    </content>
  </content-attributes>>
```

FIG.21

```
<!ENTITY control-attribute-part  
  <control-attributes>  
    <billing unit=30 second amount=1.5 currency=JPY>  
      usage-based  
      <local-link> & movie1 </local-link>  
    </billing>  
    <admitted-consumers>  
      <certification> FOO Movie Customers </certification>  
    </admitted-consumers>  
    <access-conditions> parental-guidance </access-conditions>  
    <execution-environment>  
      </user-unit-requirement>  
      <hard-drive-space> 40 </hard-drive-space>  
      <memory-space> 8 </memory-space>  
      <graphics> 640×480×16 </graphics>  
      <audio> 16 </audio>  
      <user-unit-requirement>  
    </execution-environment>  
    <encryption scheme=RSA key-sort=open> #87654321098765 </encryption>  
  </control-attributes>
```

FIG22

```
<!ENTITY sequence-part
  <sequences>
    <!ENTITY picture1
      <picture hsize=300 vsize=200 color=256>
        <source> <local-link> picture-link1 </local-link> </source>
      </picture>>

    <!ENTITY picture2
      <picture hsize=300 vsize=200 color=256>
        <source> <local-link> picture-link2 </local-link> </source>
      </picture>>

    <!ENTITY audio1
      <audio sampling-size=16>
        <source> <local-link> audio-link1 </local-link> </source>
      </audio>>

    <!ENTITY video1
      <video hsize=450 vsize=300 color=256 frame-rate=30>
        <source> <local-link> video-link1 </local-link> </source>
      </video>>

    <!ENTITY movie1
      <video hsize=450 vsize=300 color=256 format=MPEG2>
        <source> <local-link> movie-link1 </local-link> </source>
      </video>>

    <!ENTITY viewer2
      <viewer min-hsize=440 min-vsize=330> </viewer>>
    <open-window> & viewer2 </open-window>
    <before delay=0 max-skew=500 duration=3> & picture1 & audio1 </before>
    <while delay1=0 delay2=0 max-skew=80> & audio1 & video1 </while>
    <before delay=0 max-skew=500> & audio1 & picture2 </before>
    <before delay=0 max-skew=500 duration=2> & picture2 & movie1 </before>
    <before delay=0 max-skew=500> & movie1 & picture1 </before>
  </sequences>>
</package>
```

FIG.23

```
<package>
  <title format=DVL version=2.0>
    <cover> Authentication </cover>
    <name>"Authentication FOO Movie Services" </name>
    <sort> VOUCHER <minor-sort> AUTHNTICATION </minor-sort> </sort>
    <structure>
      <encrypted scheme=RSA key=#87654321098765 key-sort=open>
        <content-attributes>
          <user> Japan Taro </user>
          <account> #55443322 </sccount>
          <age> 25 </age>
          <data> 9 August 1997 </data>
          <time> 19:45 JST </time>
        </content-attributes>
        <control-attributes>
          <settlement> charge
            <credit-card> VISA </credit-card>
            <card-number> 0123 4567 8901 2345 </card-number>
            <holder> Japan Taro </holder>
            <expires> June 1999 </expires>
          </settlement>
        </control-attributes>
      <sequences>
        <text>
          <certification> FOO Movie Customers </certification>
          <name> "FOO Movie Services:Star Wars" </name>
          <reference> net-resource://movie-server/movie1 </reference>
        </text>
      </sequences>
    </encrypted>
  </structure>
  </title>
</package>
```

FIG.24

```
<package>
  <title format=DVL version=2.0>
    <cover> Bill </cover>
    <name>"Bill: FOO Movie Services" </name>
    <sort> VOUCHER <minor-sort> BILL </minor-sort> </sort>
    <structure>
      <encrypted scheme=RSA key=#32109876543210 key-sort=open>
        <content-attributes>
          <sender> FOO Movie Services </sender>
          <data> 31 August 1997 </data>
          <time> 9:00 EDT </time>
        </content-attributes>
        <control-attributes>
          <billing currency=USD> 1,200 </billing>
          <settlement> money-transfer
            <bank> Bank Antarctica </bank>
            <branch> New York </branch>
            <holder> FOO Movie Services </holder>
            <account> 012345-678901 </account>
          </settlement>
        </control-attributes>
        <sequences>
          <text>
            <customer> BAR Food Services </customer>
            <content> Request for Monthly Payment </content>
          </text>
        </sequences>
      </encrypted>
    </structure>
  </title>
</package>
```

FIG.25

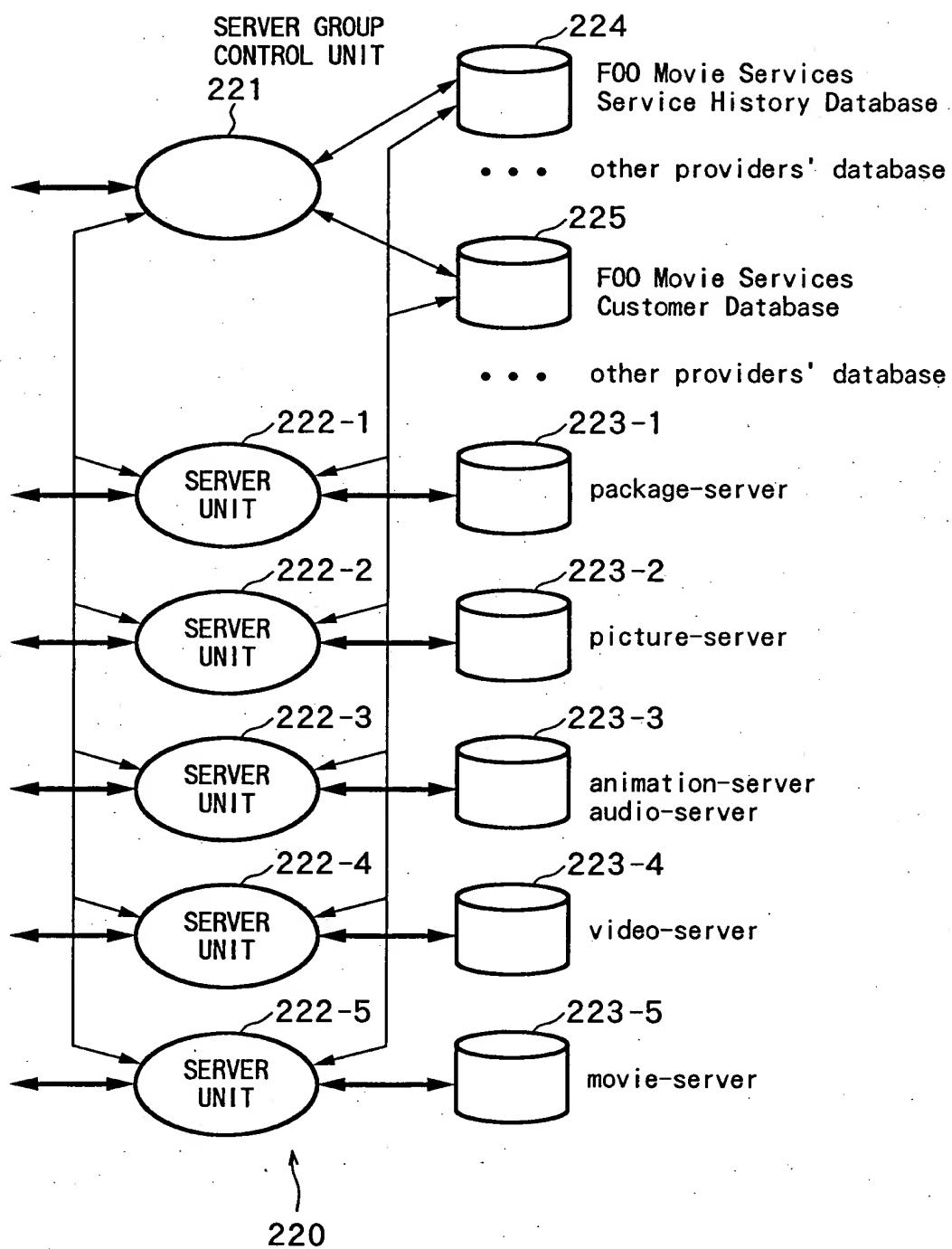


FIG.26

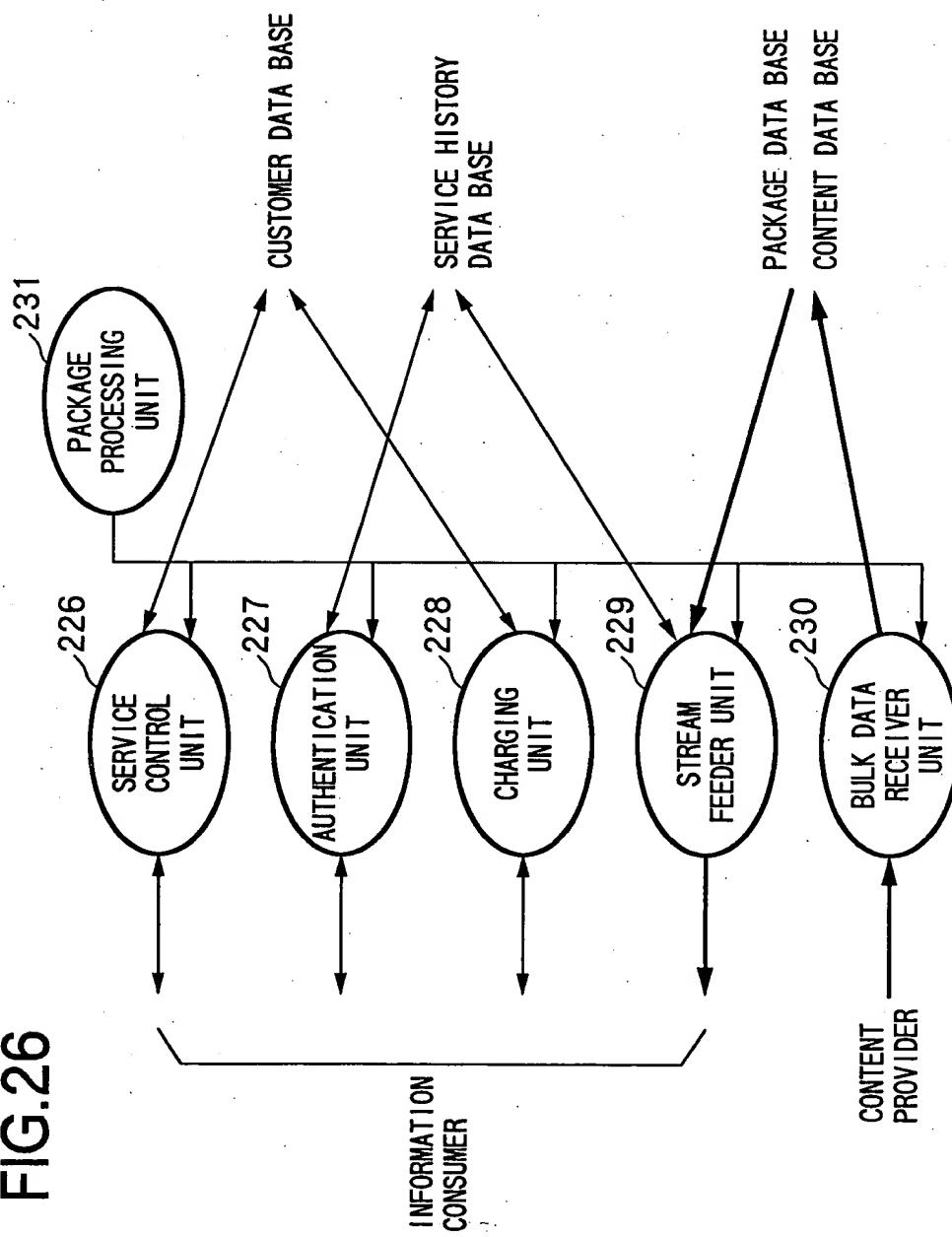


FIG.27

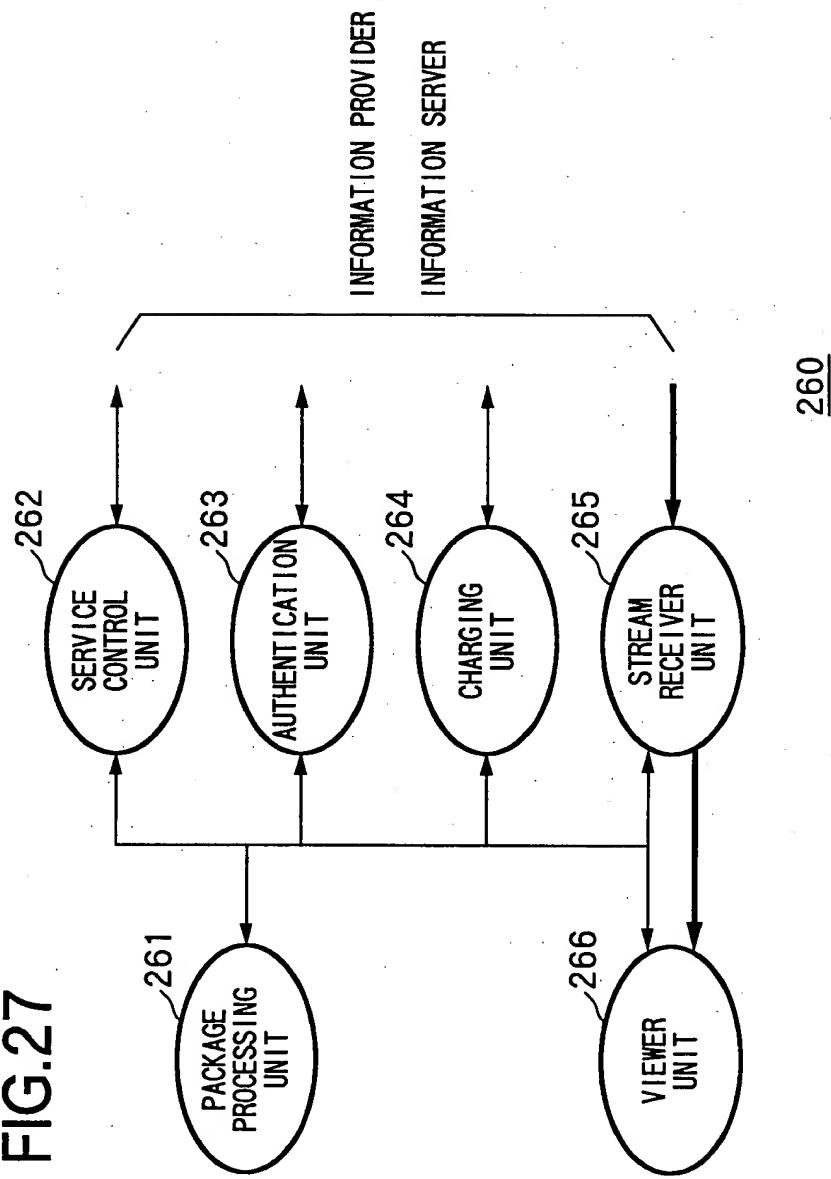
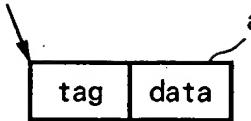


FIG.28A

<tag>data</tag>

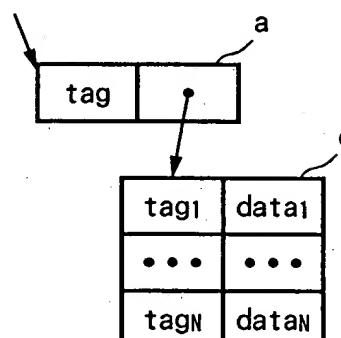
**FIG.28B**

<tag><tag1>data1</tag1>

• • • •

<tagN>dataN</tagN>

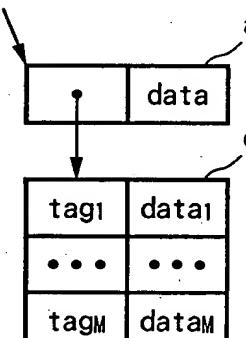
</tag>

**FIG.28C**

<tag tag1=data1...tagM=dataM>

data

</tag>

**FIG.28D**<tag tag1¹=data1¹ ... tagM¹=dataM¹><tag1²²</tag1<sup>2

• • • •

<tagN²>dataN²</tagN²>

</tag>

A diagram showing a rectangular box divided into two sections, "tag" and "data". The "data" section contains two small black dots. An arrow labeled "a" points to the right boundary of the box. Below this, a vertical arrow labeled "c" points down to a second rectangular box. This second box is divided into four smaller boxes arranged in a 2x2 grid. The top-left box is labeled "tag1¹" and the top-right is "data1¹". The bottom-left is "tagM¹" and the bottom-right is "dataM¹". Ellipses are shown in the middle rows. Another vertical arrow labeled "b" points down from the second box to a third rectangular box. This third box is also divided into four smaller boxes arranged in a 2x2 grid. The top-left box is labeled "tag1²" and the top-right is "data1²". The bottom-left is "tagN²" and the bottom-right is "dataN²". Ellipses are shown in the middle rows.</sup>

FIG.29

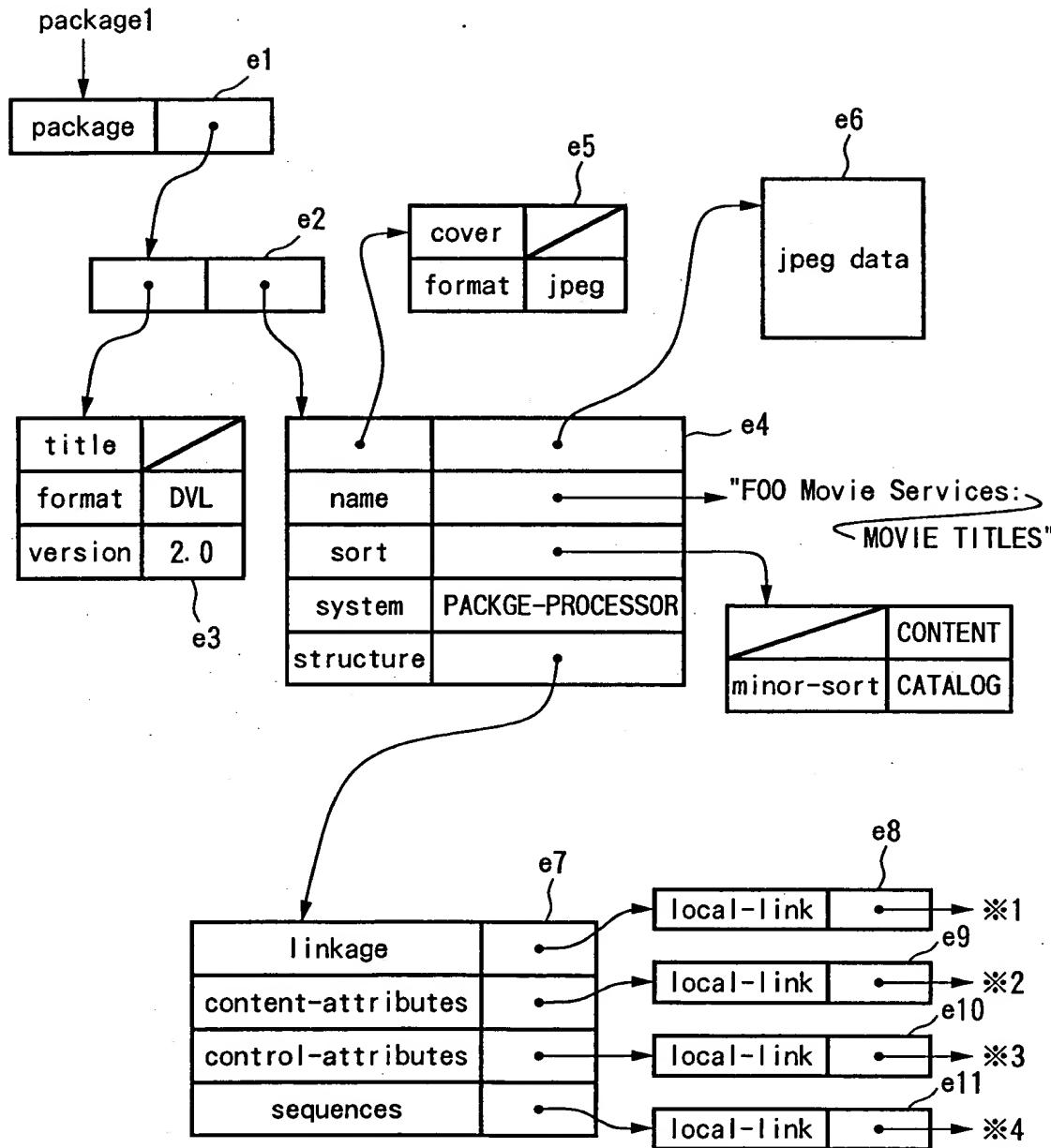


FIG.30

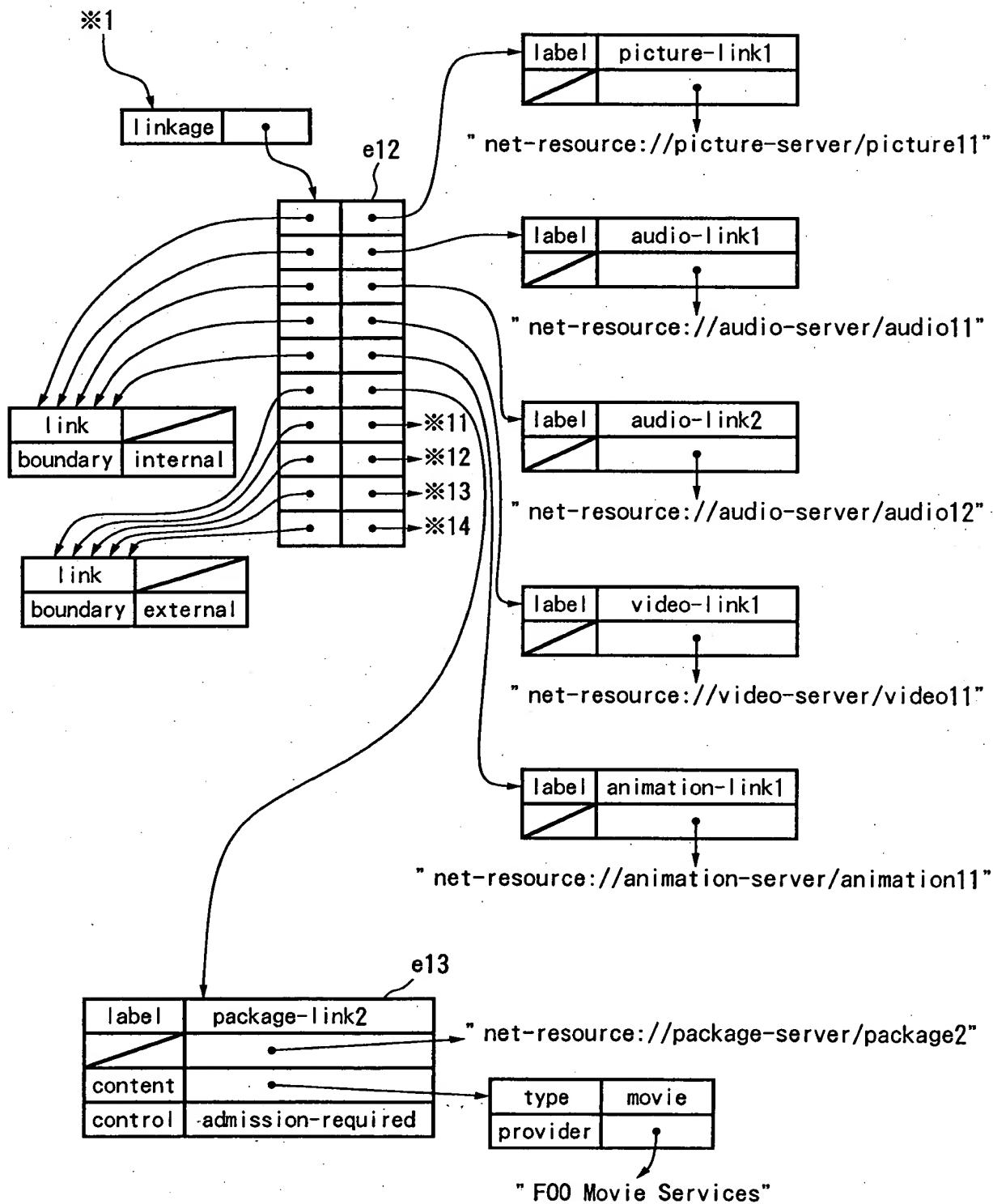


FIG.31

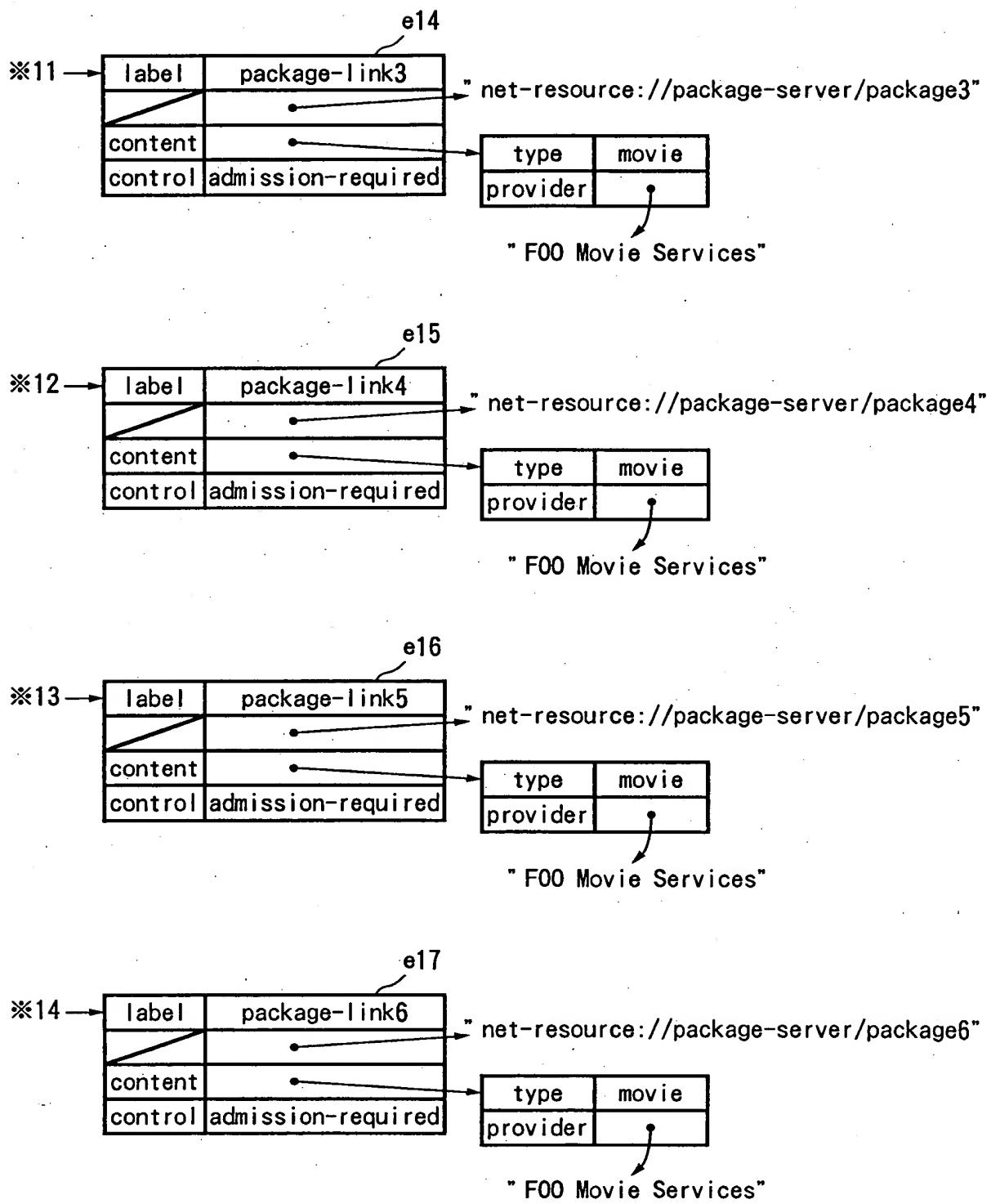


FIG.32

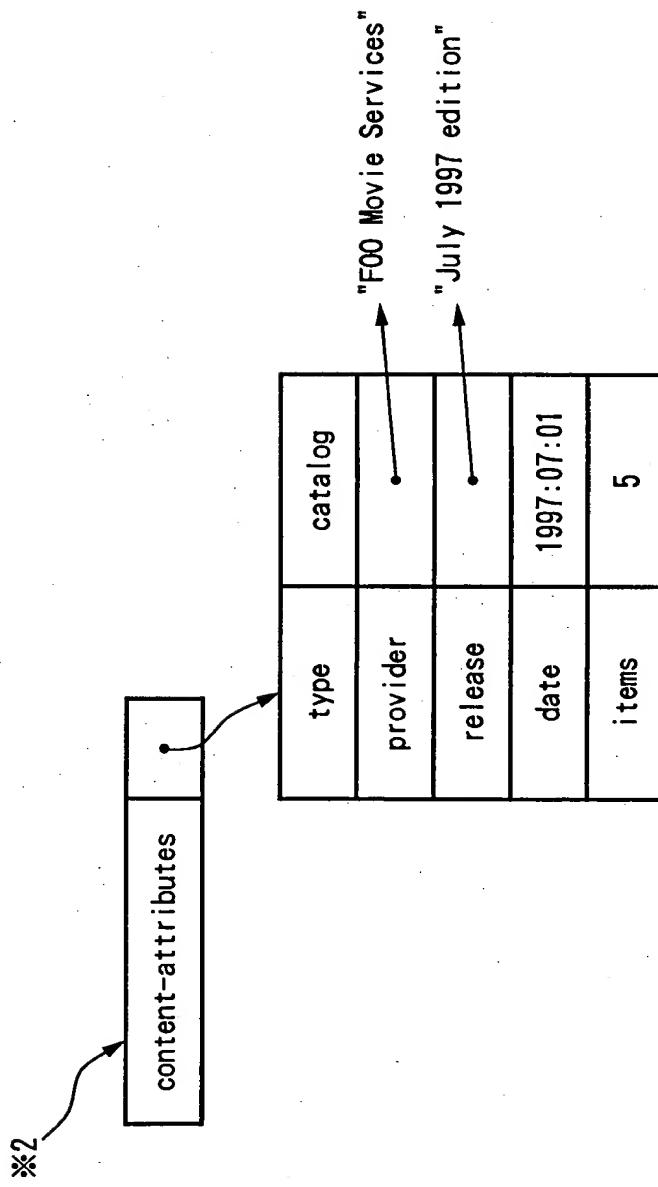


FIG.33

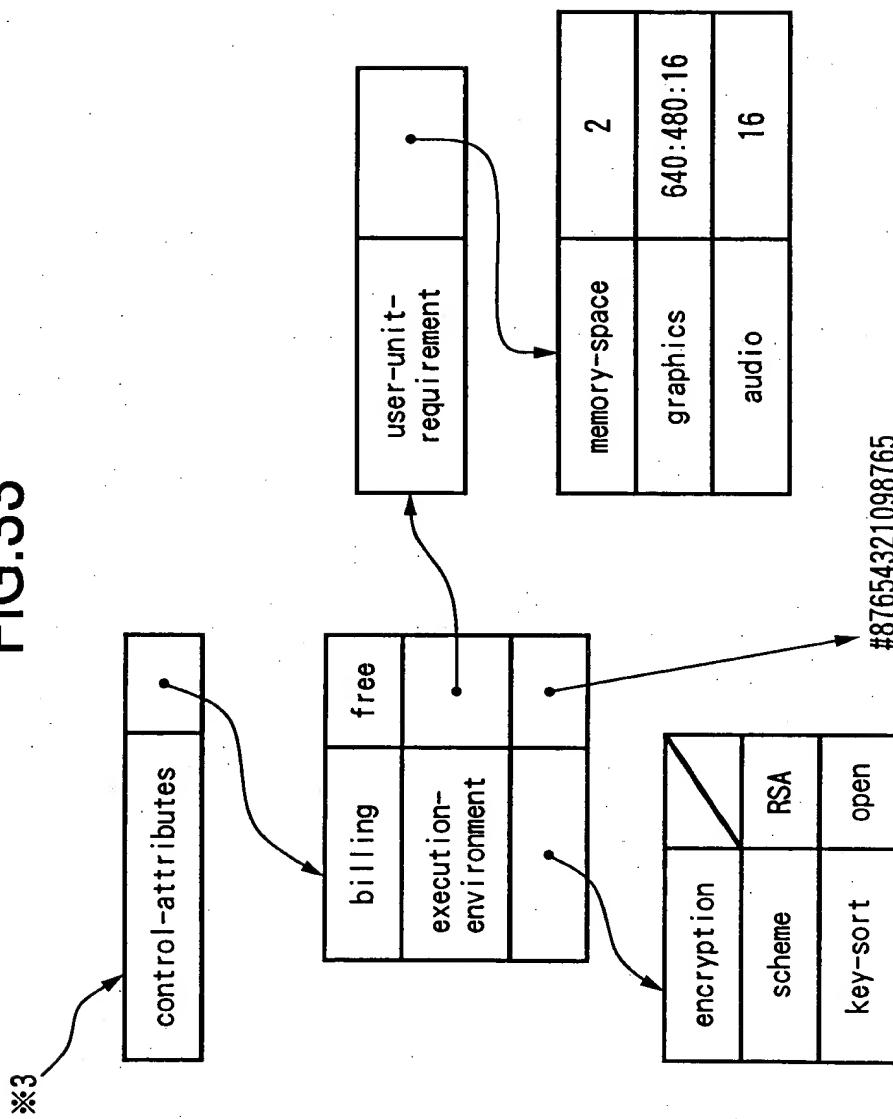


FIG.34

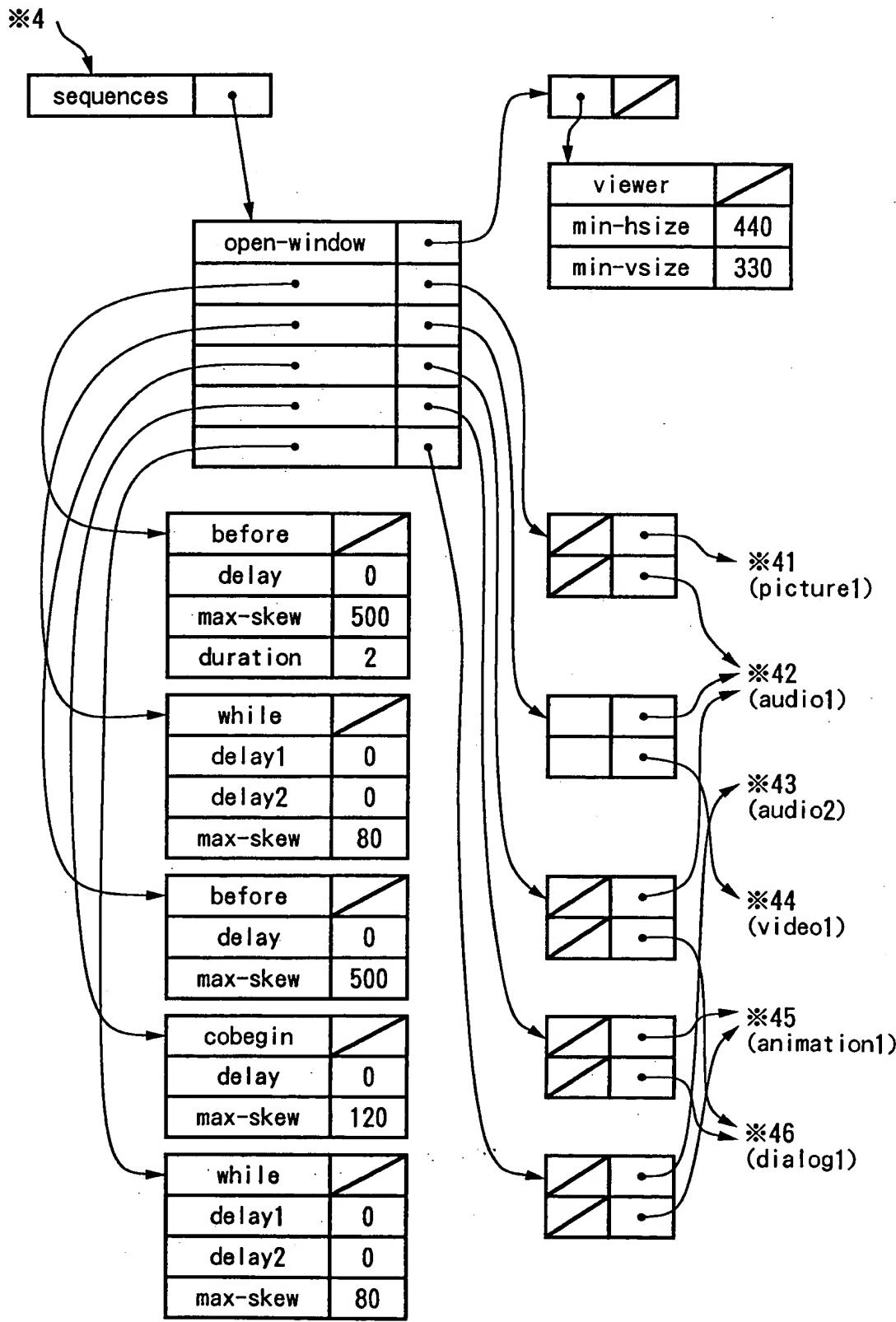


FIG.35

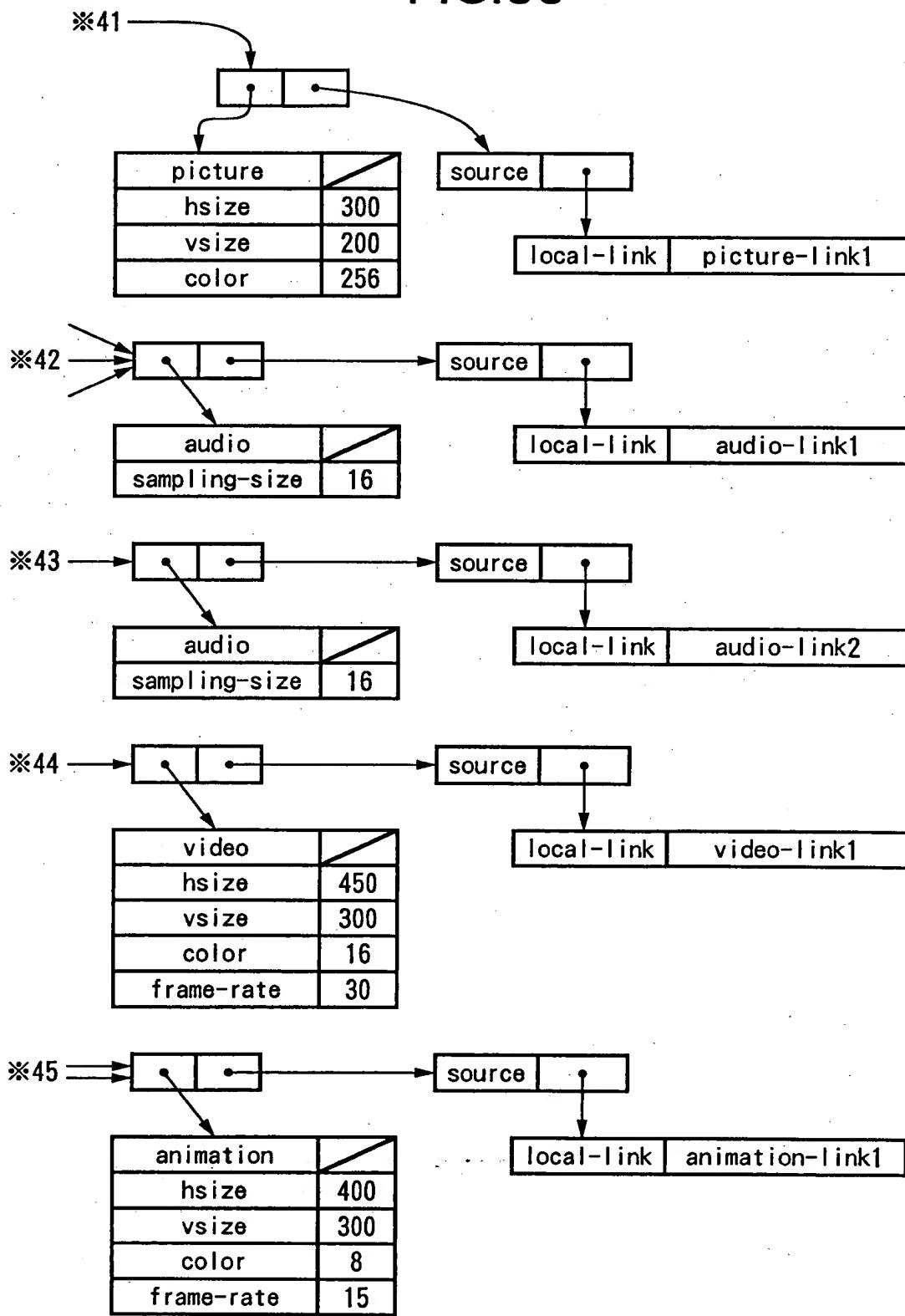


FIG.36

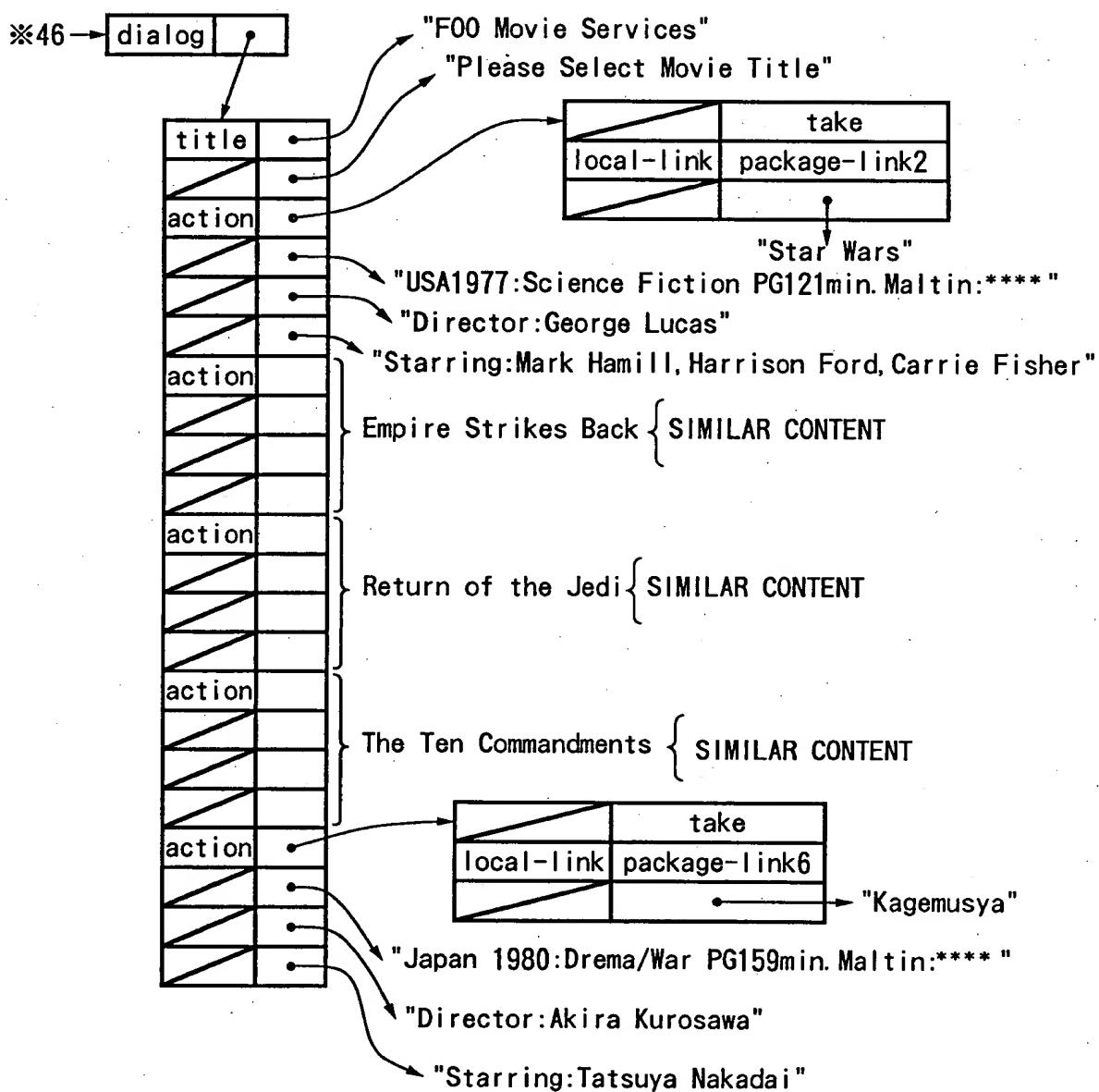


FIG.37

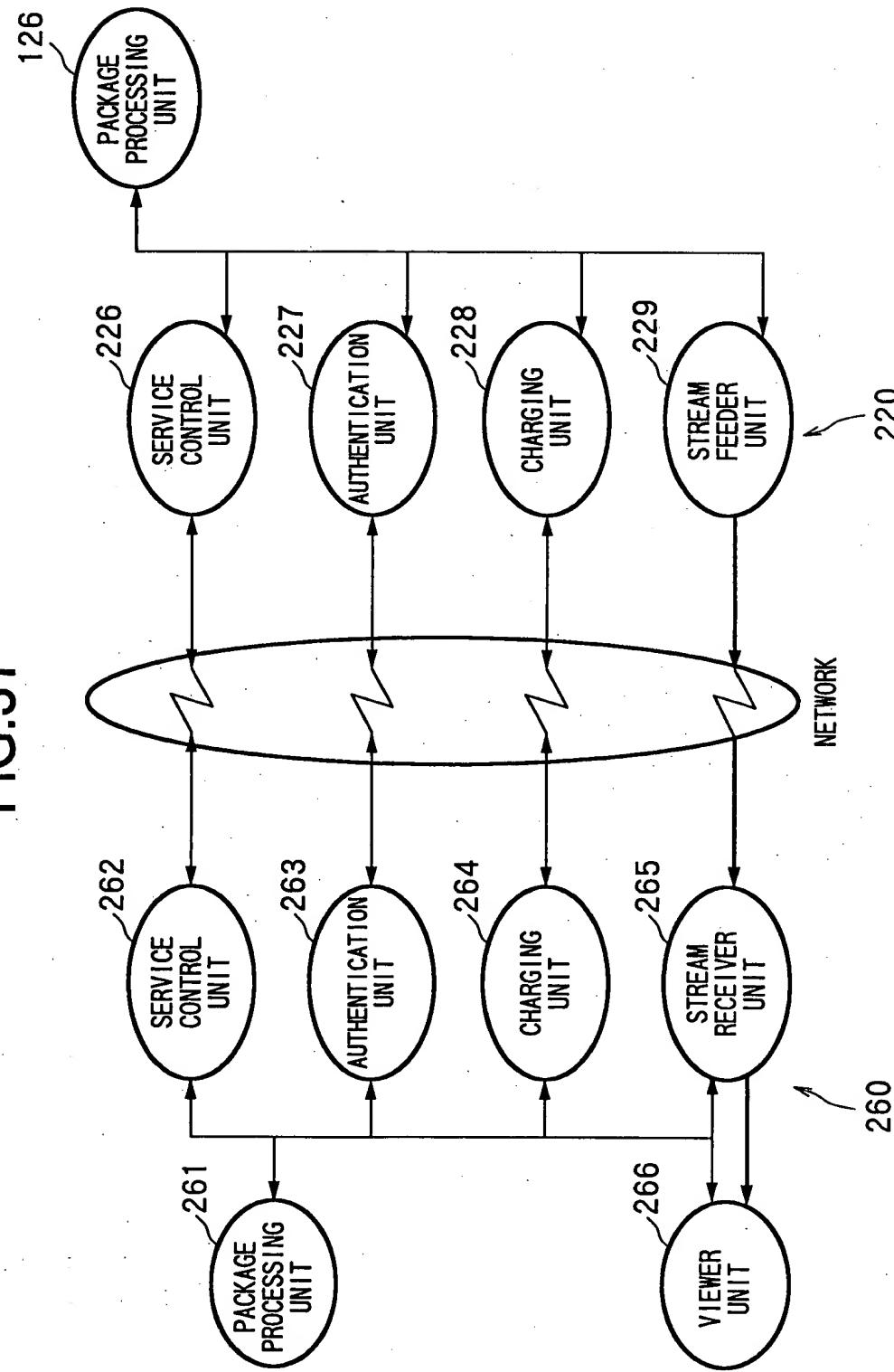


FIG.38

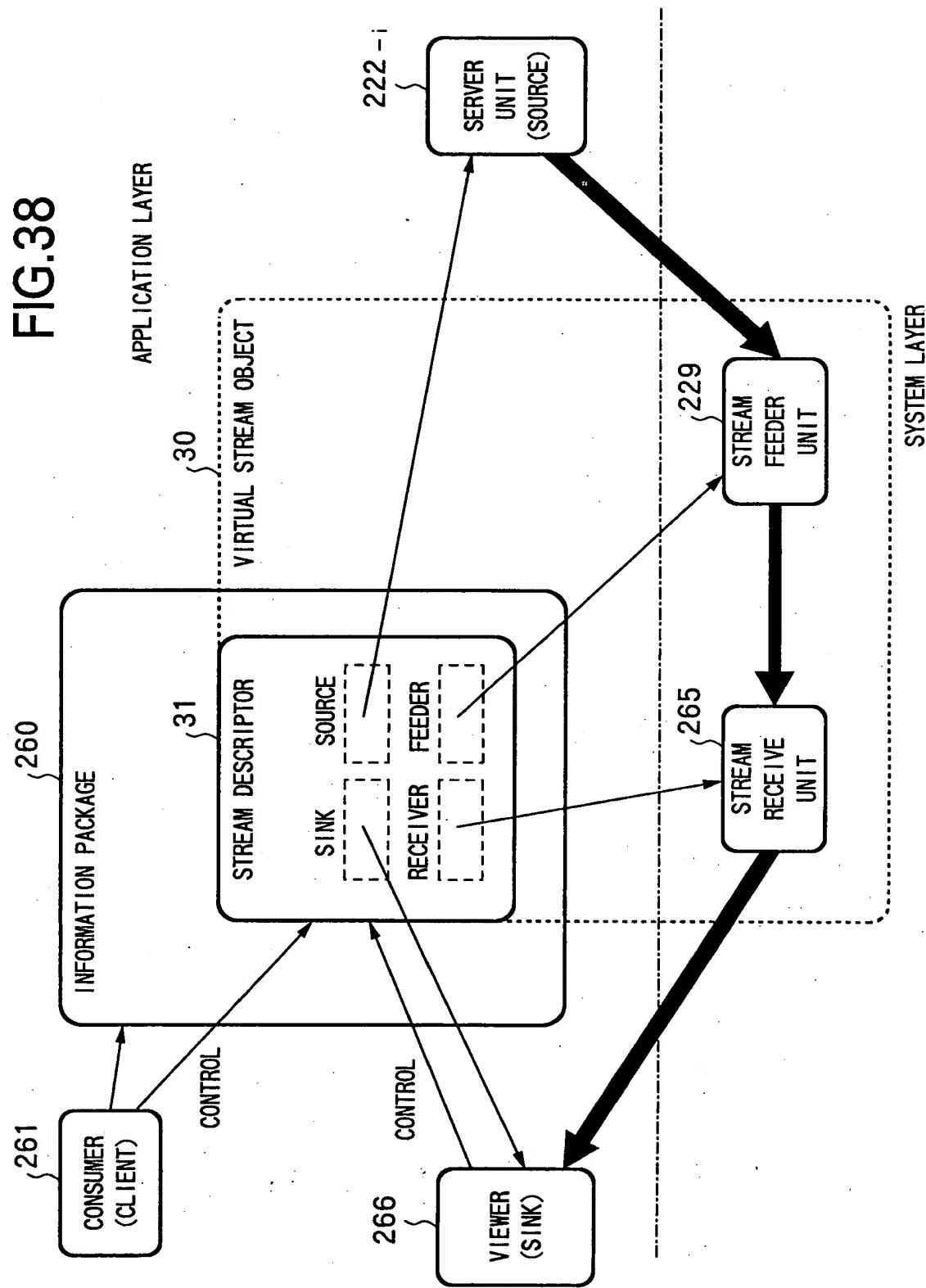


FIG.39

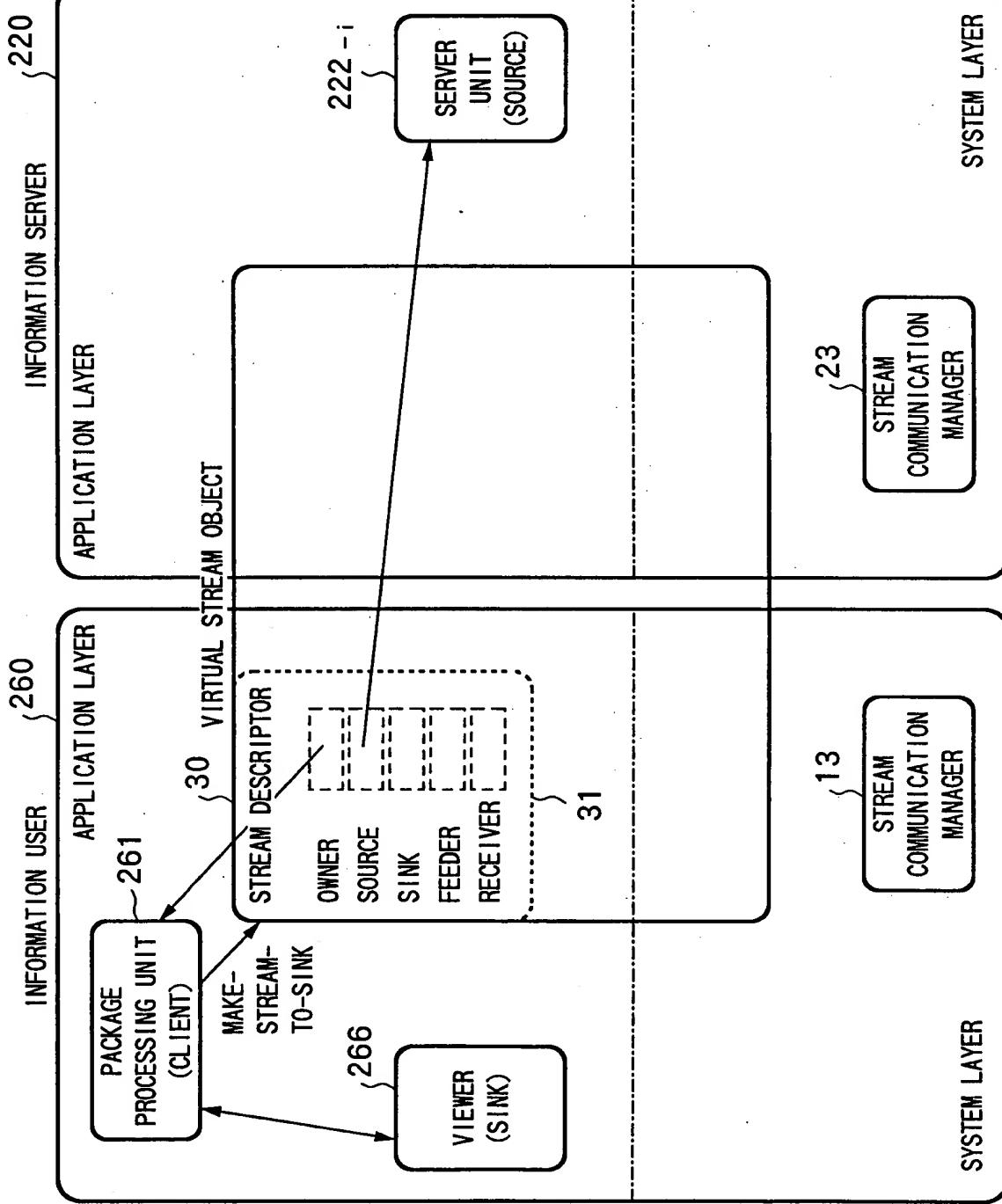


FIG. 40

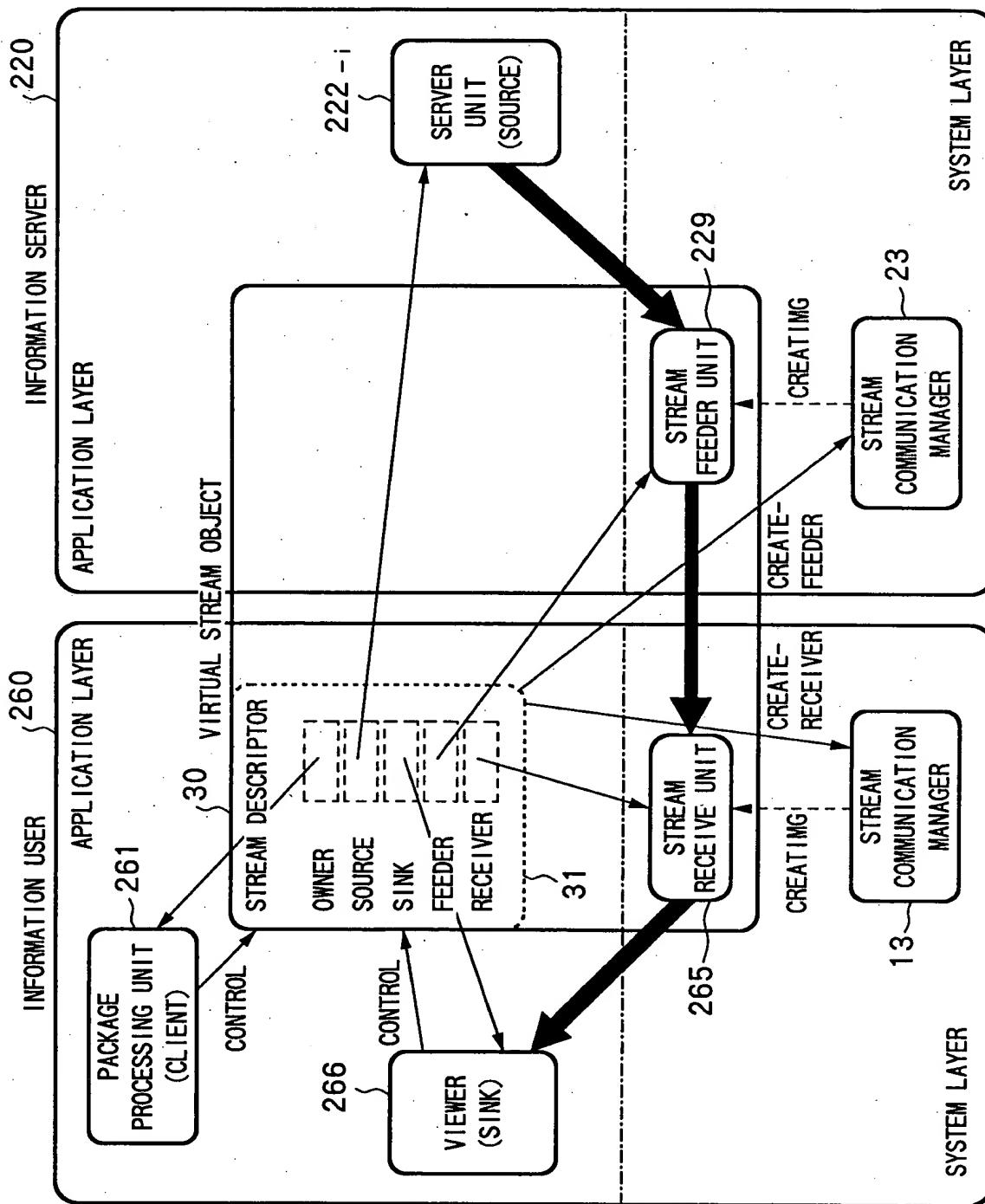


FIG.41

SEQUENCE SCRIPT

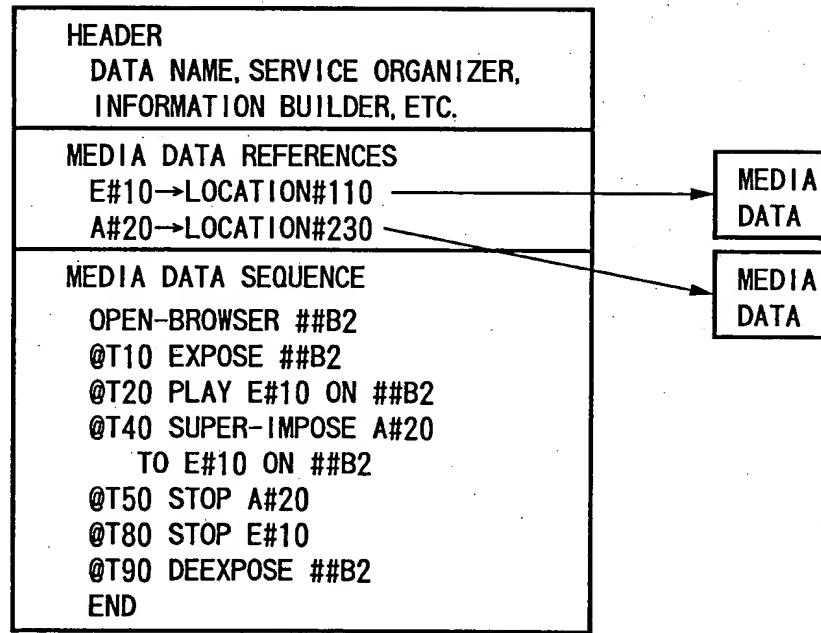


FIG.42

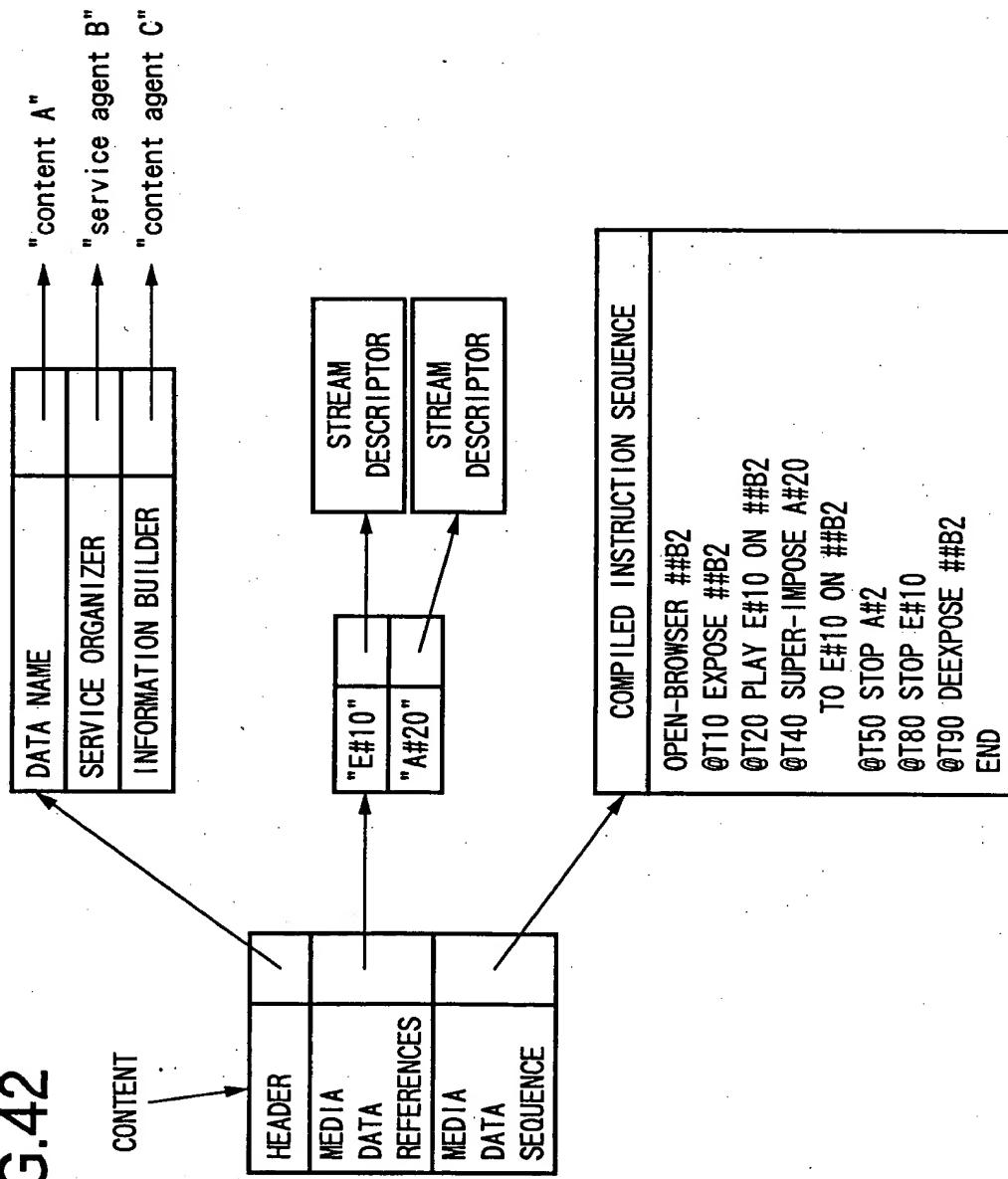


FIG.43

CreateStream

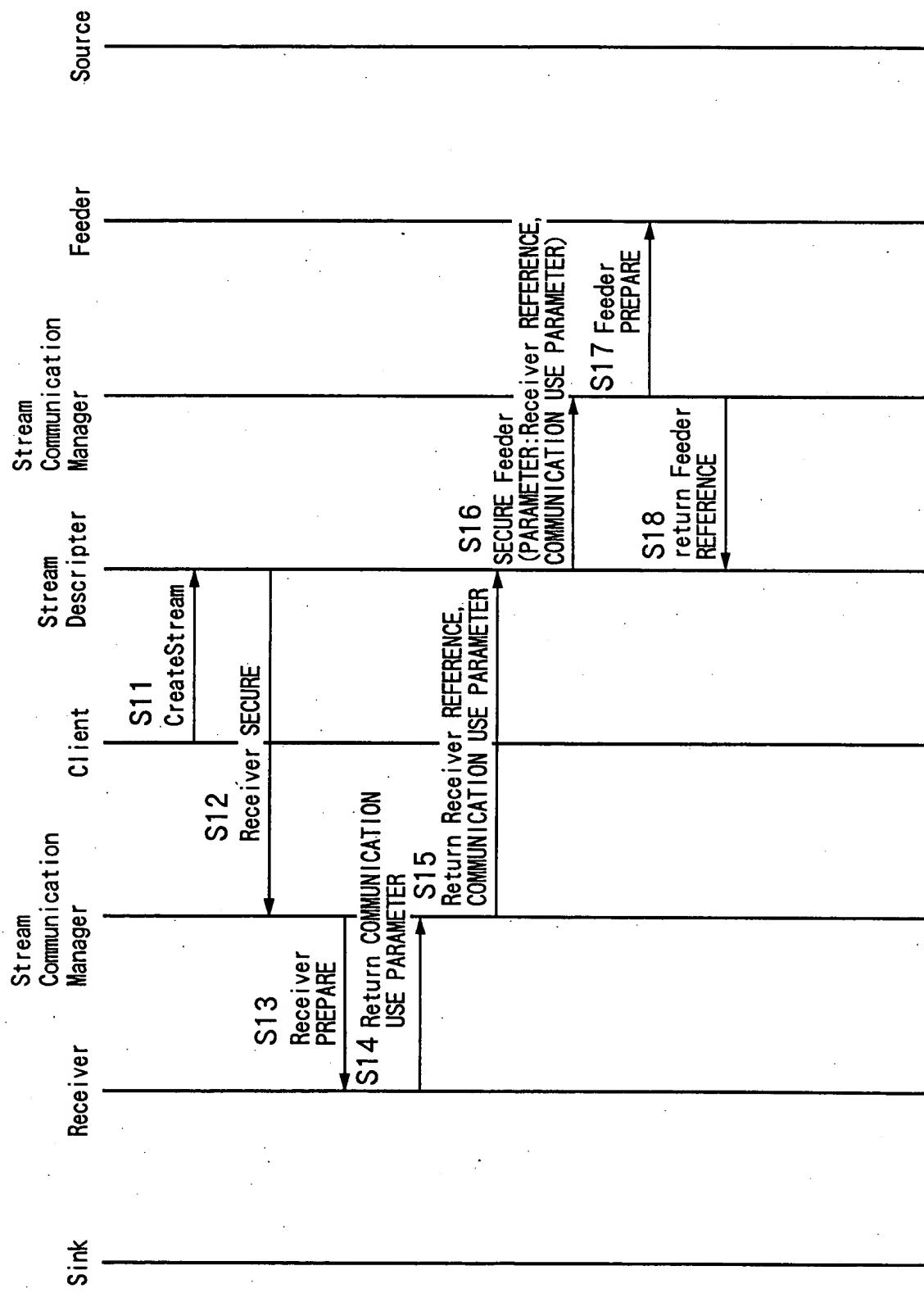


FIG.44

StartStream

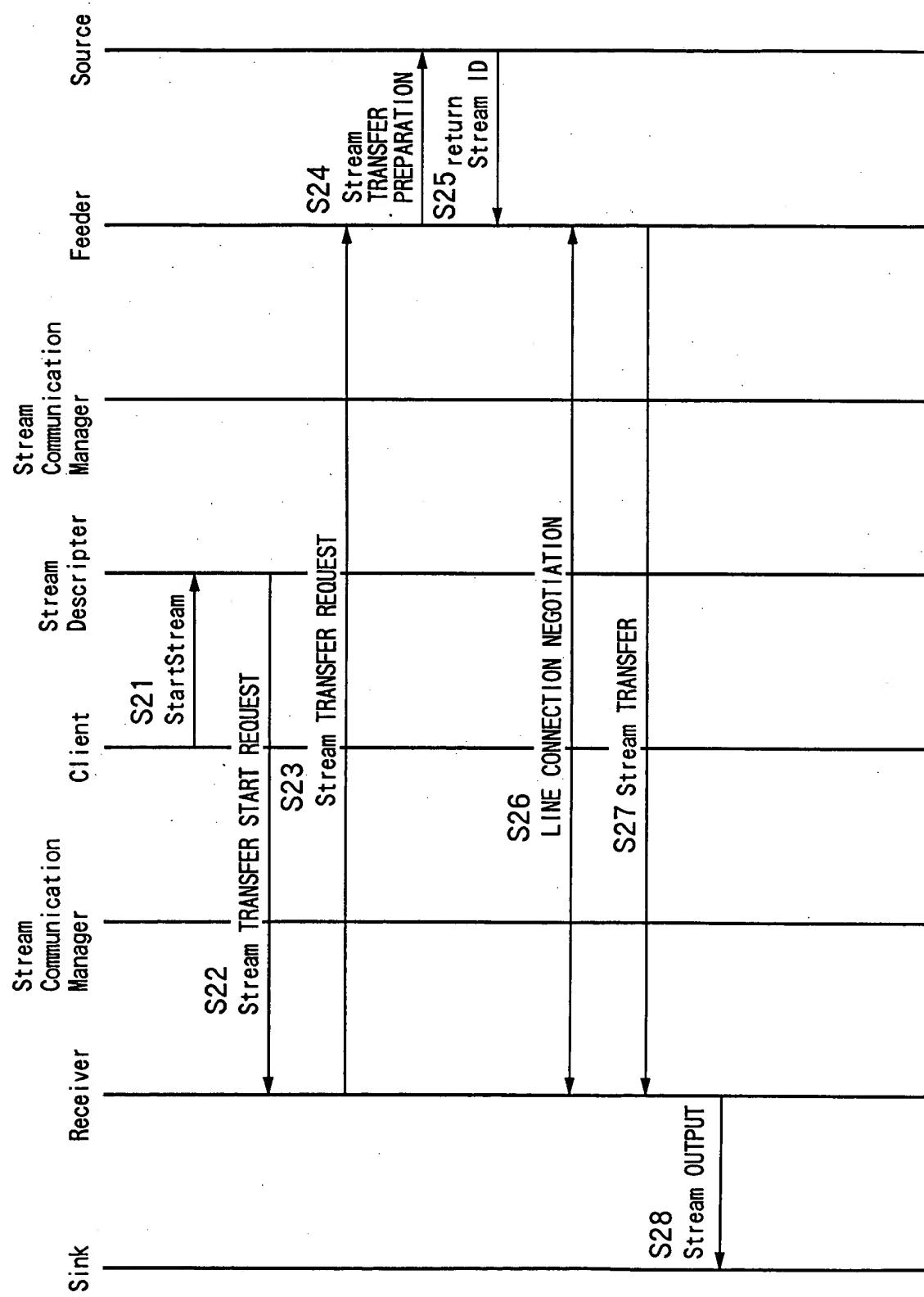


FIG.45A

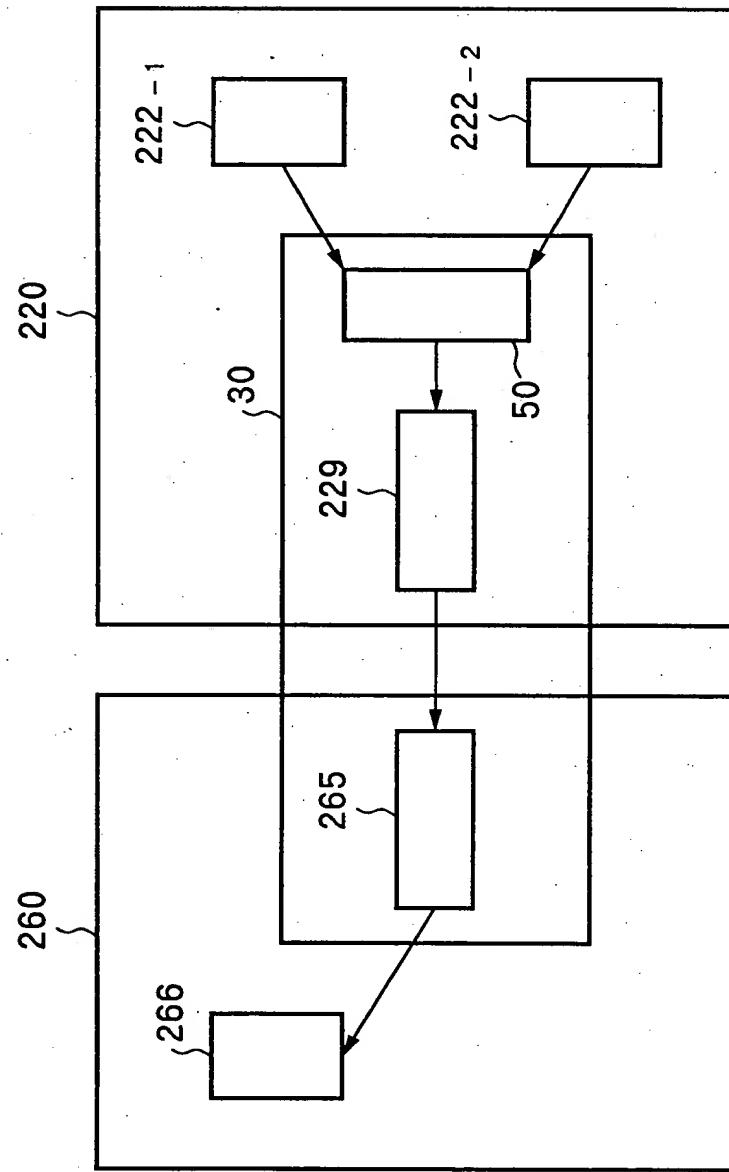


FIG.45B

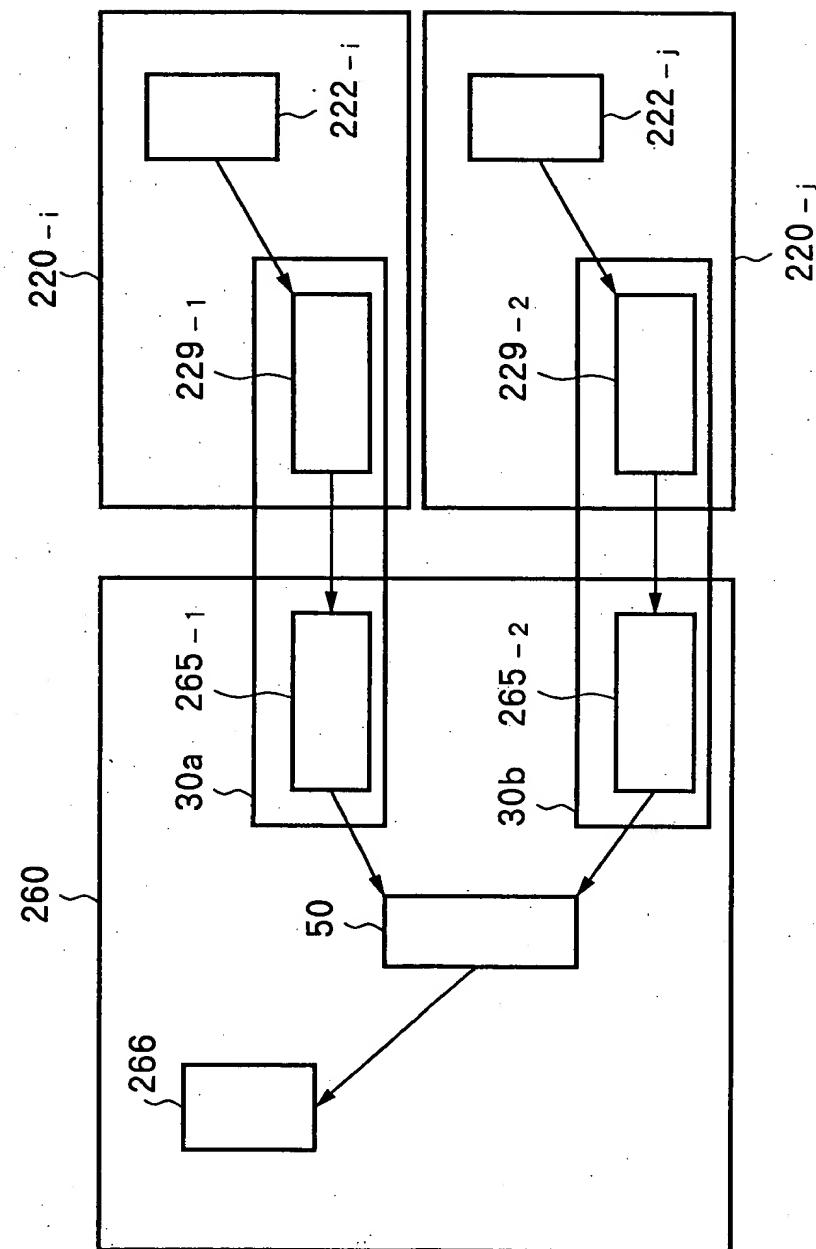


FIG.46

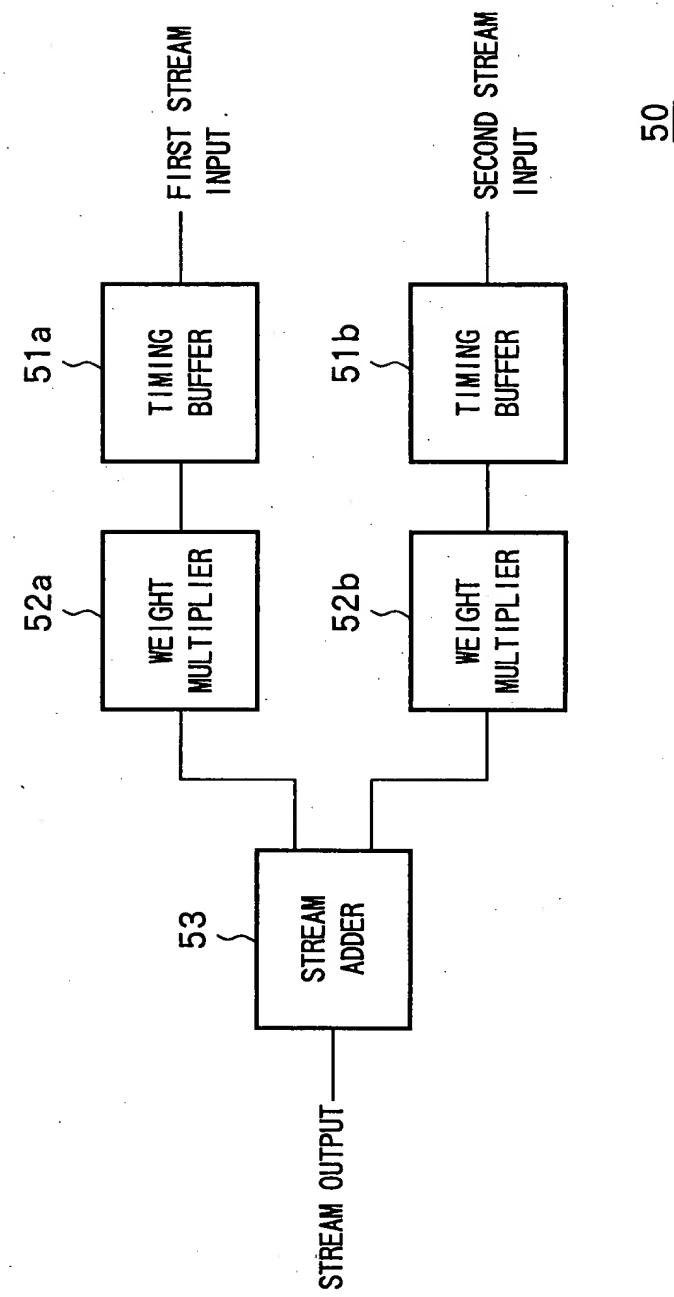


FIG.47A

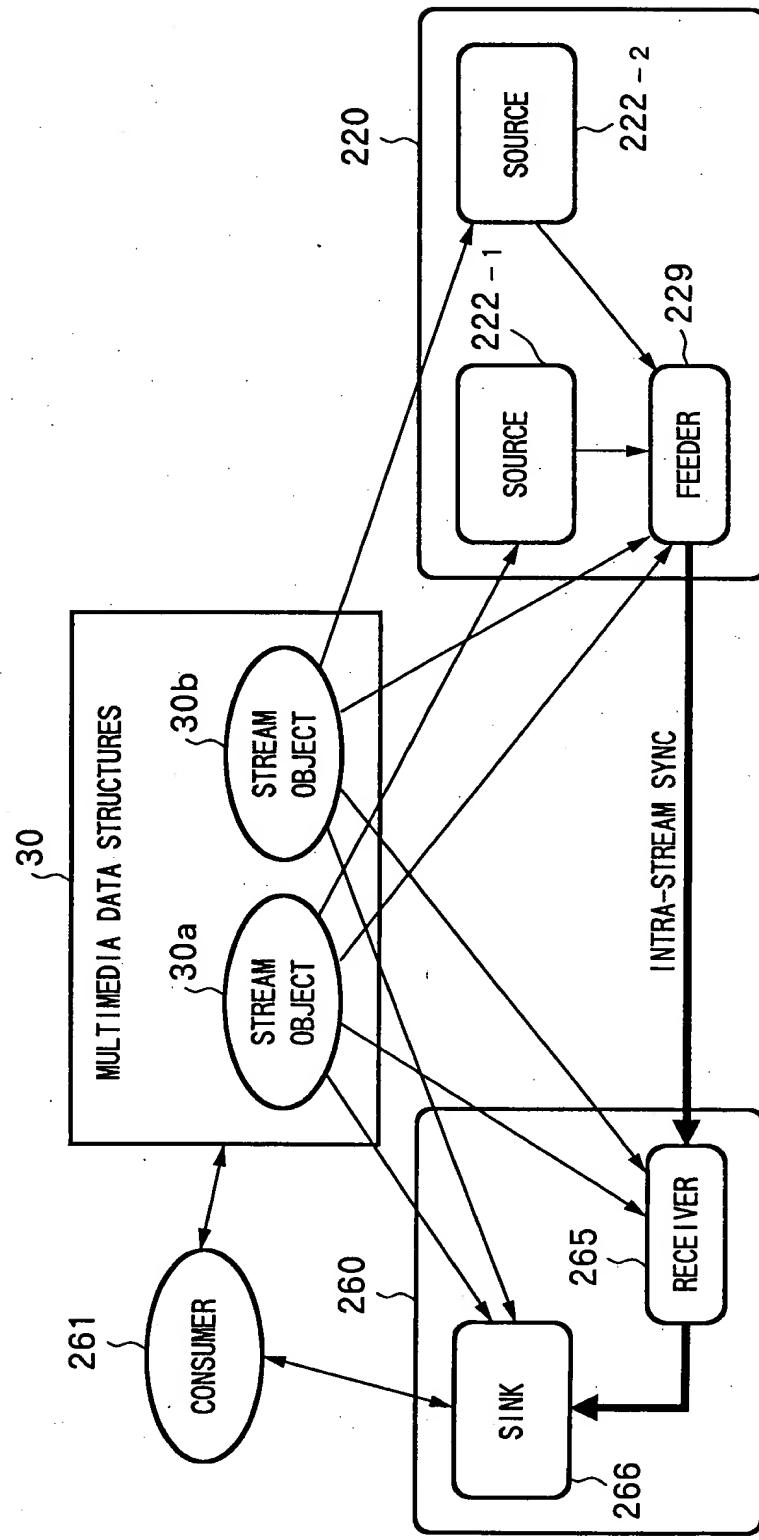


FIG.47B

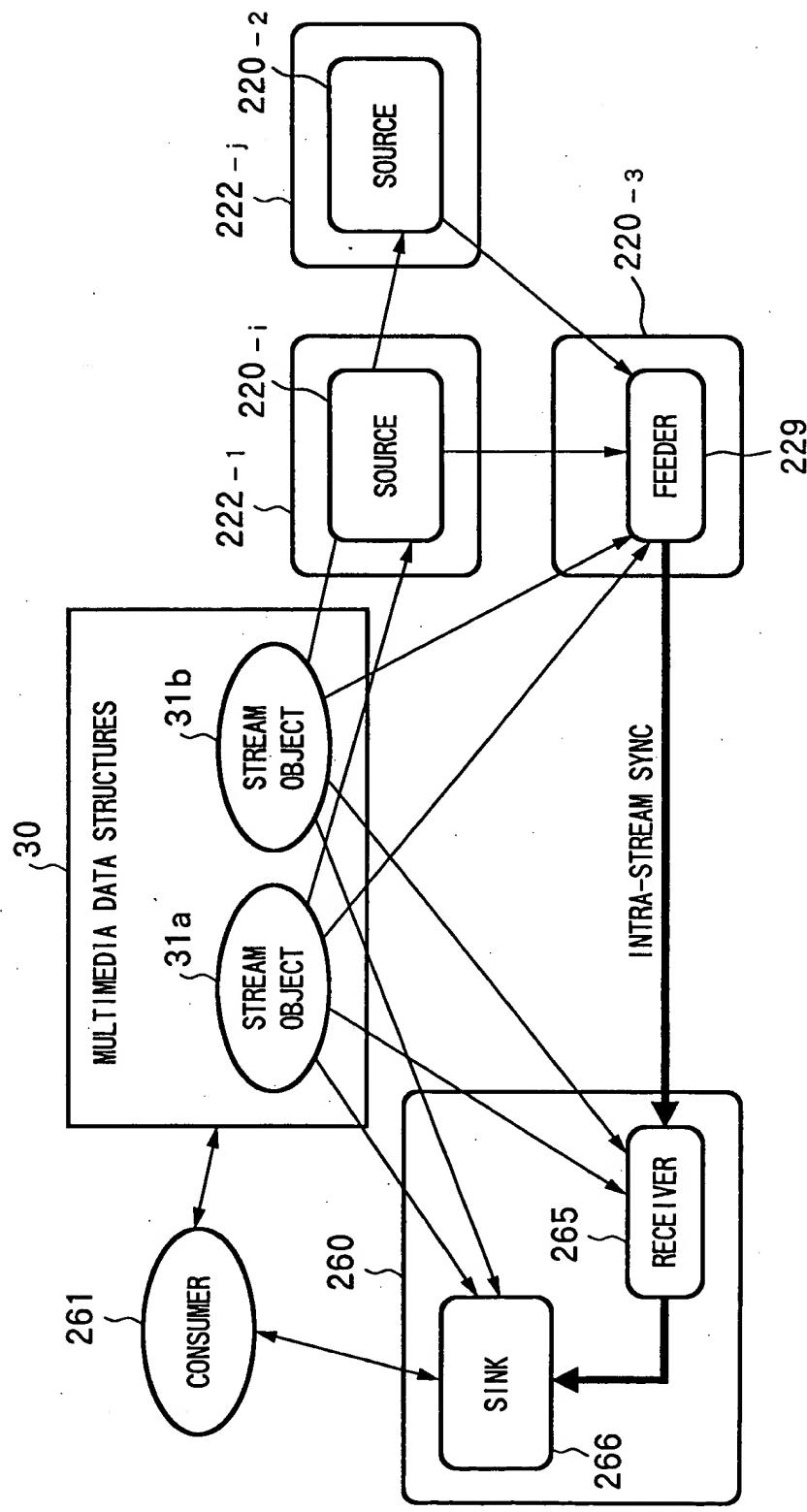


FIG.48

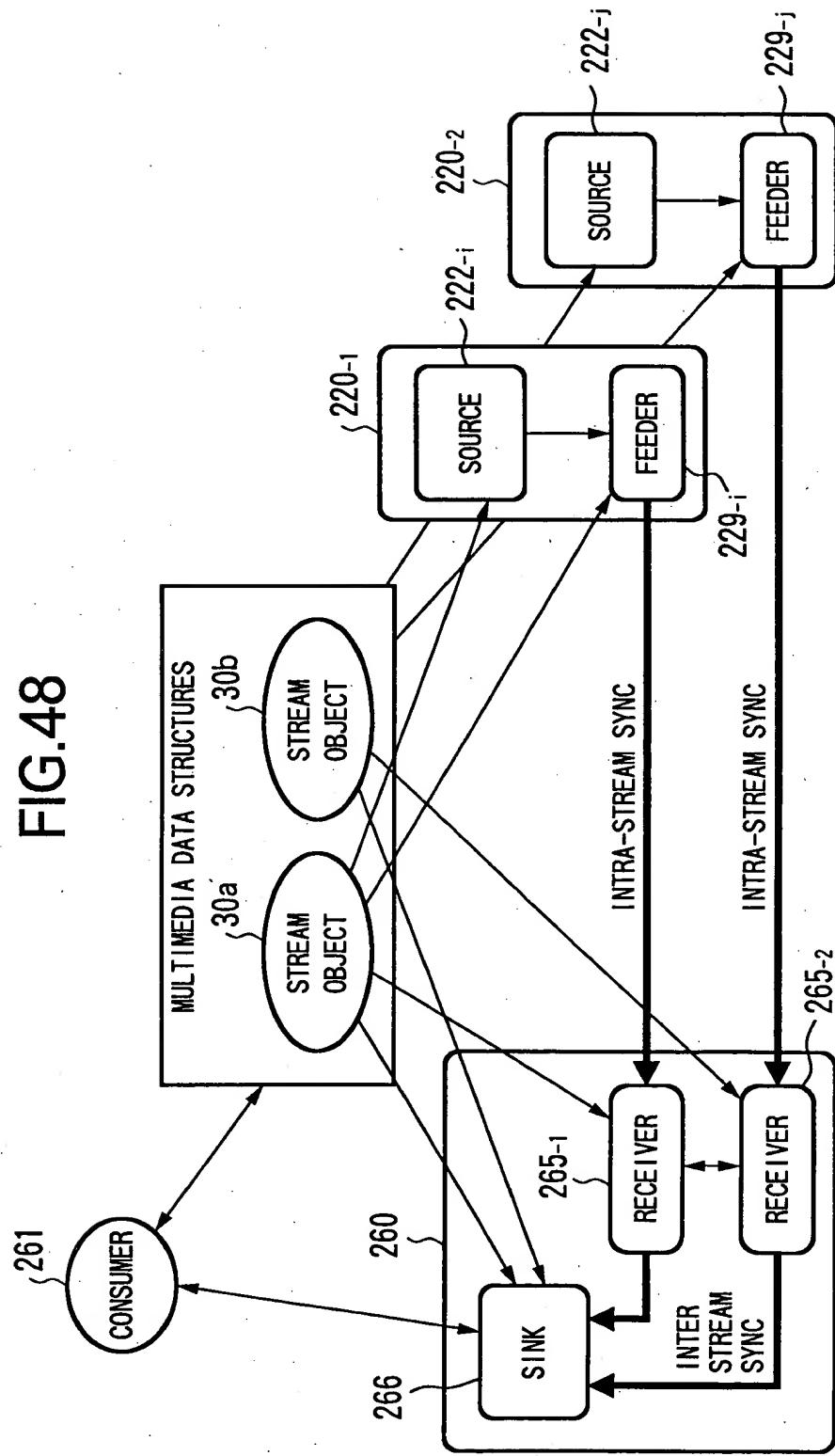


FIG.49

DISTRIBUTED MULTIMEDIA APPLICATION

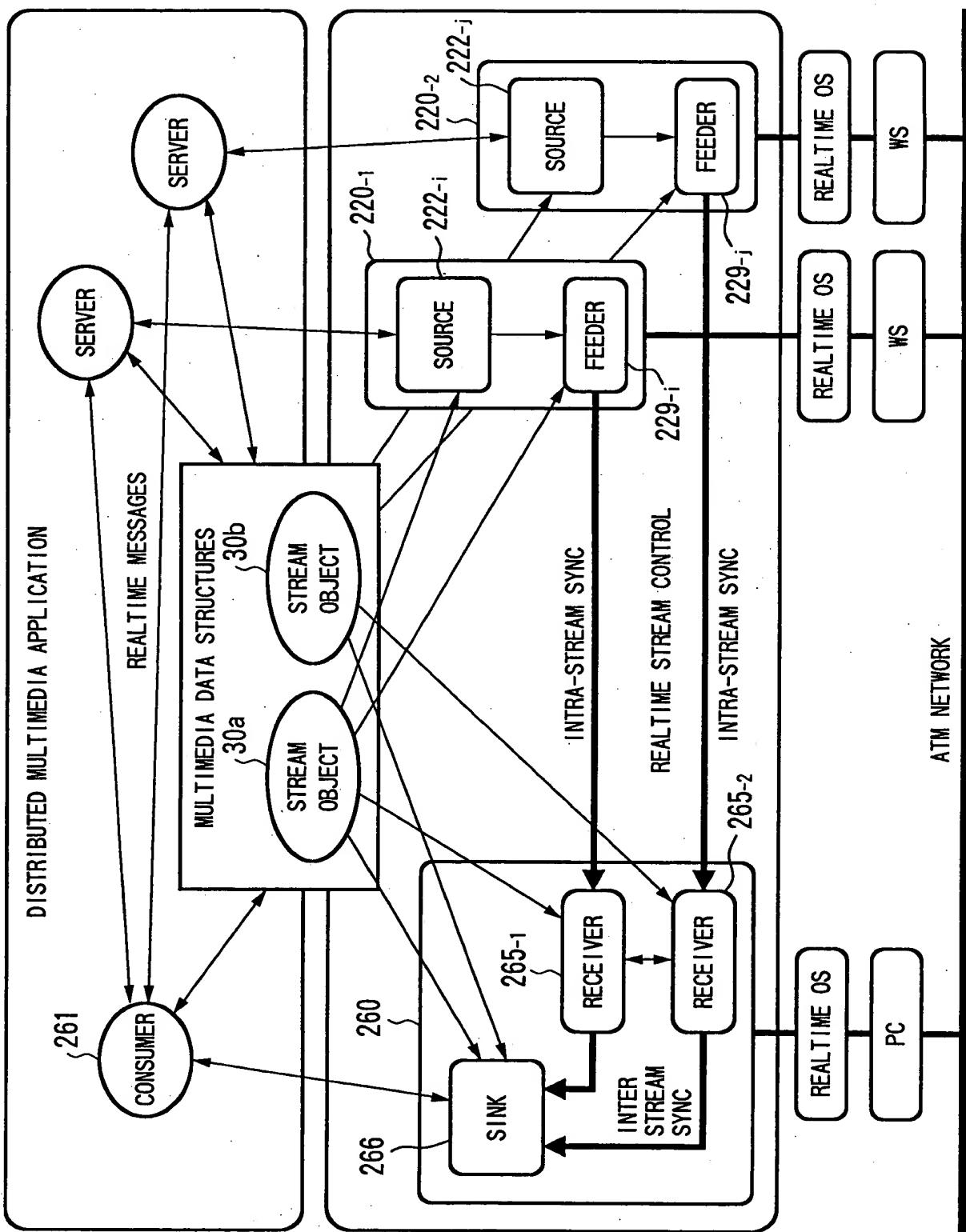


FIG.50

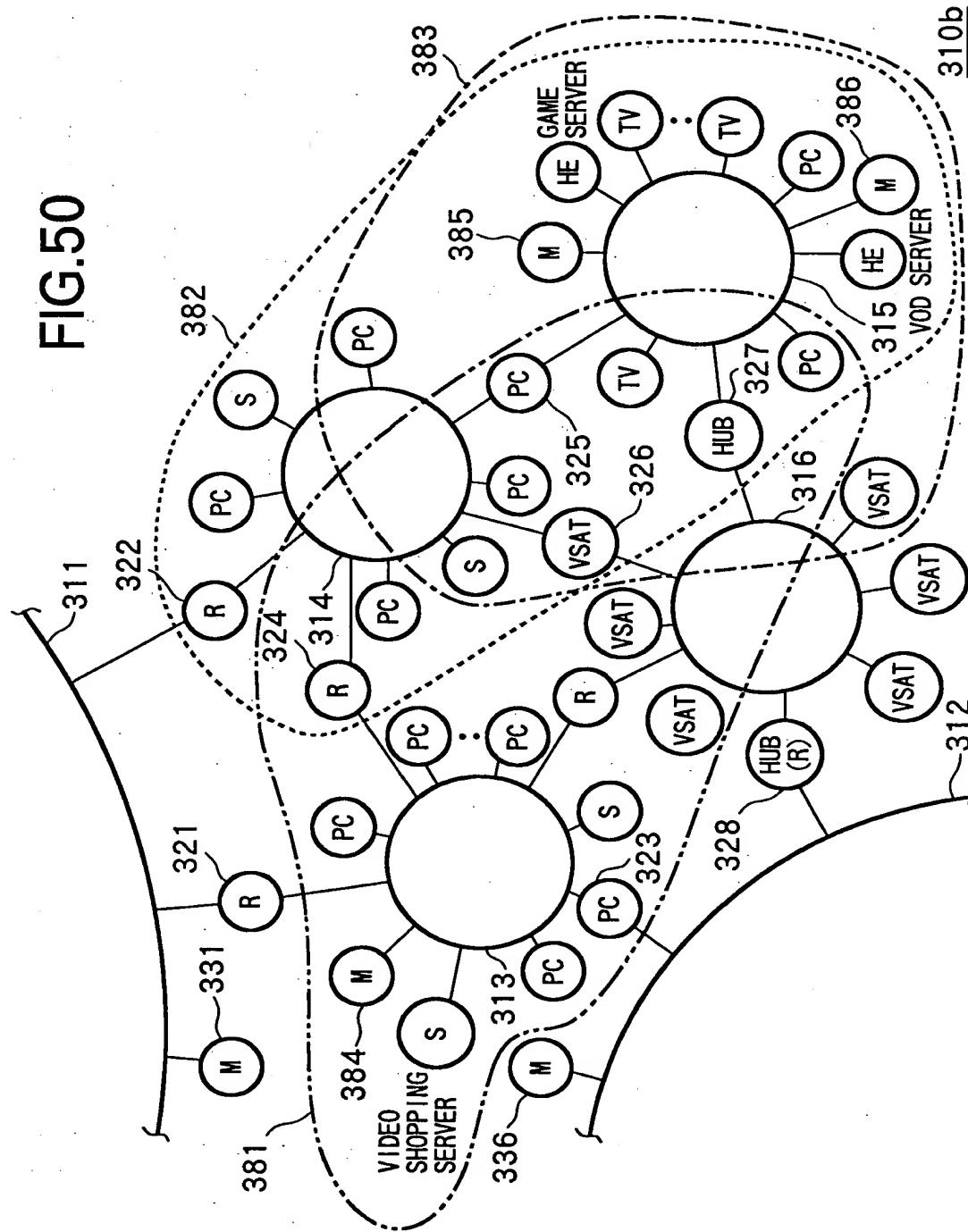


FIG.51A

Token:

(mediate instruction destination task result-handling token-ID
origin-node origin-mediator token-sender co-successors)

Instruction:

search, connect, perform, or collect

Destination:

((name "FOO Movie Services Server")
(reference 'domain local node reference')
(object-name "package-server")
(object-reference 'domain local object reference')
(network-domain network-provider)
(problem-domain "multimedia-network-service")
(application-domain "video-on-demand")
(communication-medium internet))

Task:

(object method arguments)

Result-Handling:

return-value, return-status, store, and/or propagate

FIG.51B

Token:

(mediate

search

((name "FOO Movie Services Server")
(reference 'domain local node reference')
(object-name "package-server")
(object-reference 'domain local object reference')
(network-domain network-provider)
(problem-domain "multimedia-network-service")
(application-domain "video-on-demand")
(communication-medium internet))

(object method arguments)

(return-value return-status)

token-ID

node-reference

node-reference

node-reference

(node-reference node-reference ... node-reference)

)

FIG.52

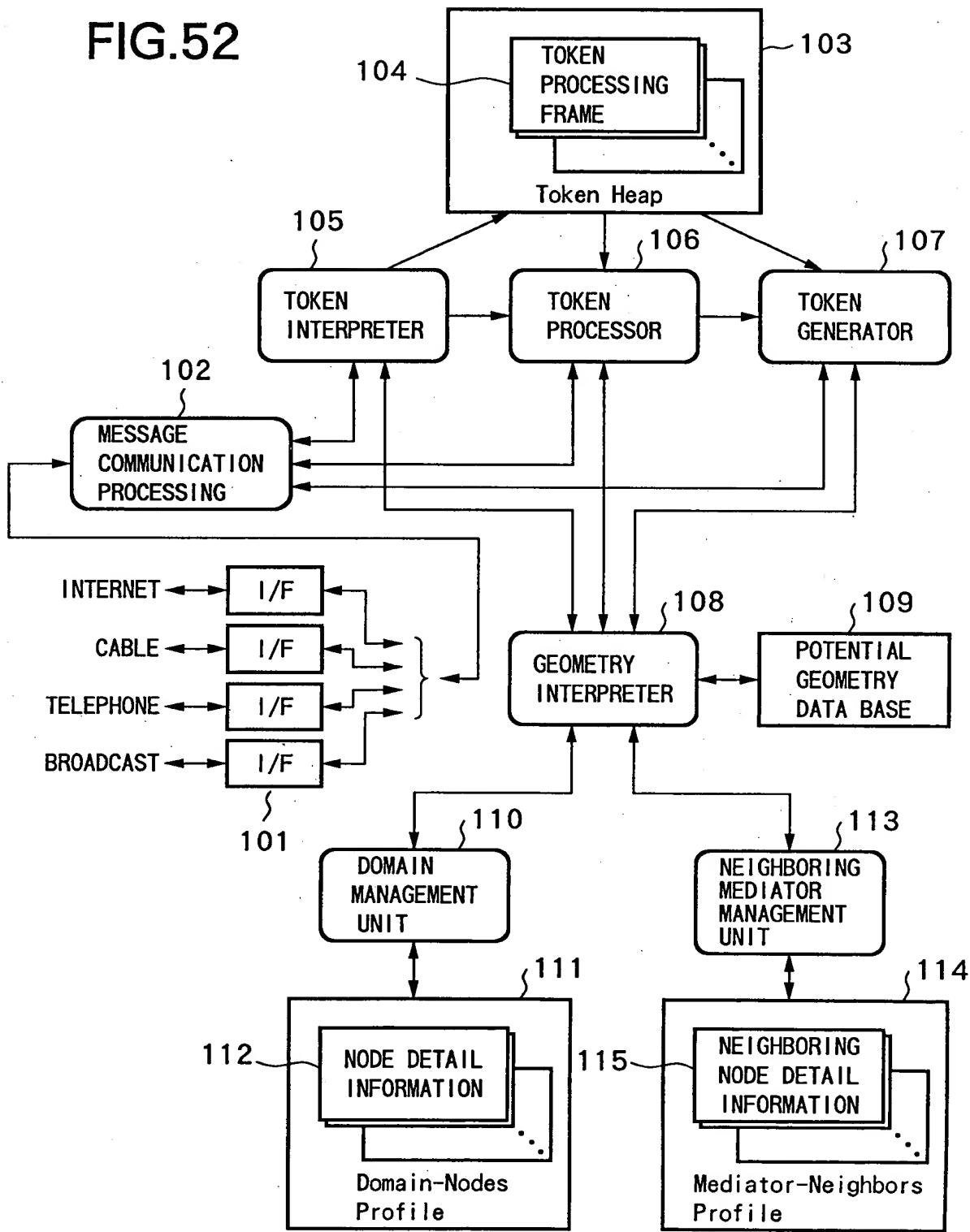


FIG.53

NAME	"FOO Movie Services Server"
REFERENCE	'domain-local-node-reference'
OBJECT NAME	"package-server"
OBJECT REFERENCE	'domain-local-object-reference'
NETWORK DOMAIN	network provider
PROGRAM DOMAIN	"multimedia-network-service"
APPLICATION DOMAIN	"video-on-demand"
COMMUNICATION MEDIA	internet

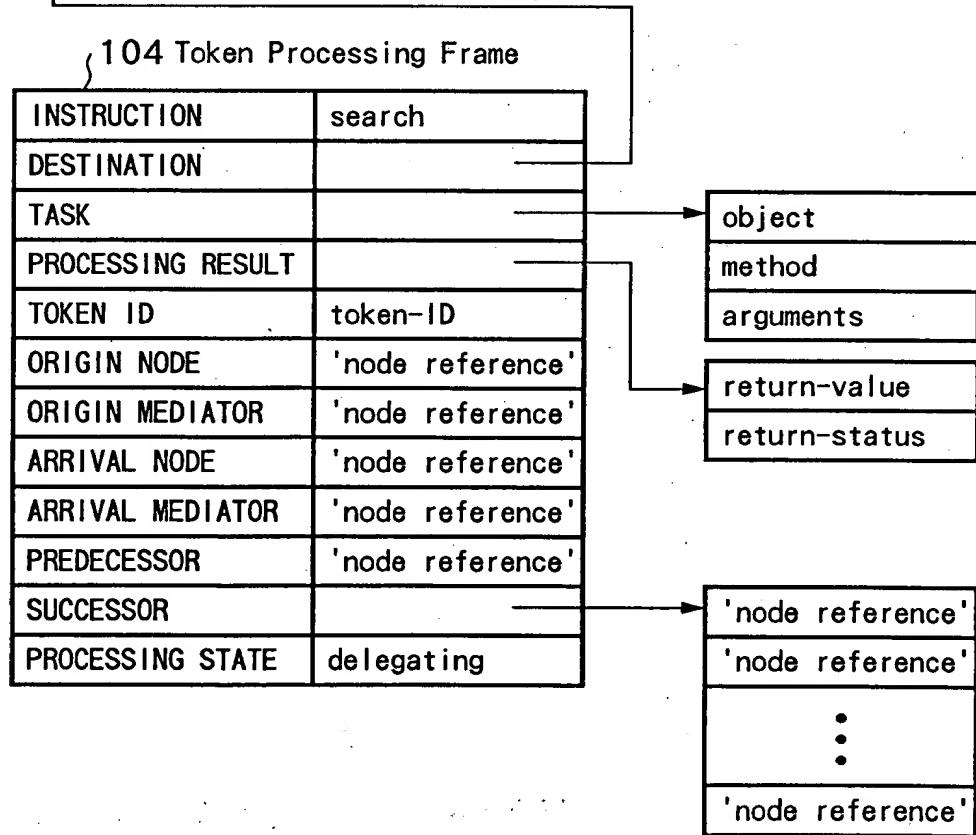


FIG.54

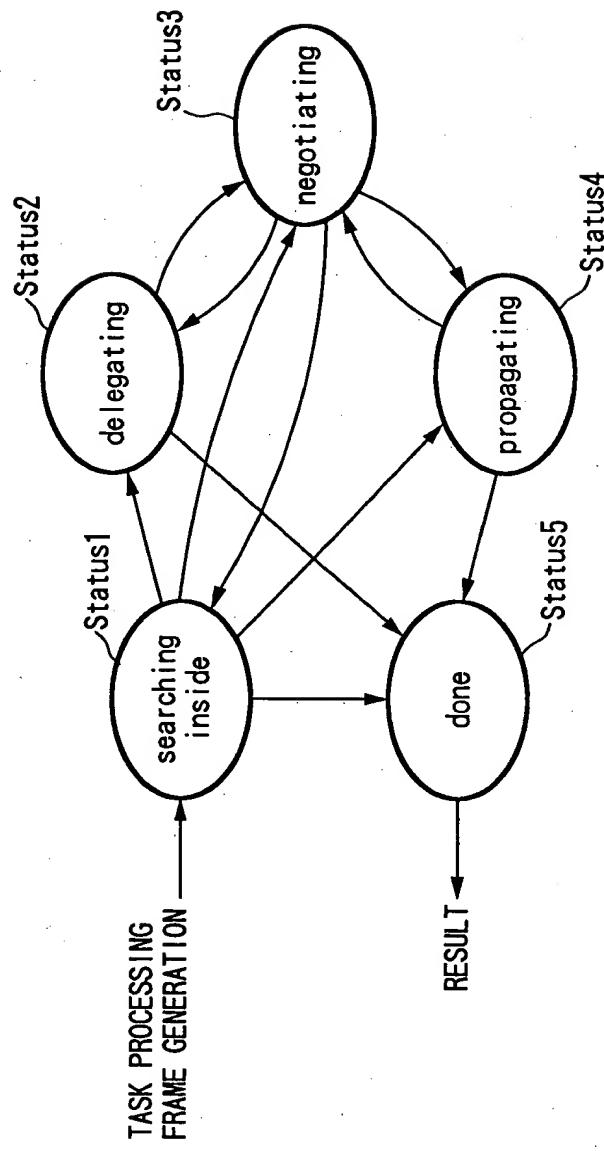


FIG.55

Network Domains

```
((domainN-1 (domainN-1i distance) (domainN-1j distance) ... (domainN-1k distance))  
 (domainN-2 (domainN-2i distance) (domainN-2j distance) ... (domainN-2k distance))  
 ...  
 (domainN-N (domainN-Ni distance) (domainN-Nj distance) ... (domainN-Nk distance)))
```

Problem Domains

```
((domainP-1 (domainP-1i distance) (domainP-1j distance) ... (domainP-1k distance))  
 (domainP-2 (domainP-2i distance) (domainP-2j distance) ... (domainP-2k distance))  
 ...  
 (domainP-N (domainP-Ni distance) (domainP-Nj distance) ... (domainP-Nk distance)))
```

Application Domains

```
((domainA-1 (domainA-1i distance) (domainA-1j distance) ... (domainA-1k distance))  
 (domainA-2 (domainA-2i distance) (domainA-2j distance) ... (domainA-2k distance))  
 ...  
 (domainA-N (domainA-Ni distance) (domainA-Nj distance) ... (domainA-Nk distance)))
```

FIG.56

NODE SERVER	VoD server
NODE NAME	XXX
REFERENCE	'node reference'
COMMUNICATION MEDIA	internet
OWNER NAME/REFERENCE	'node reference'
NETWORK DOMAIN	network provider
PROGRAM DOMAIN	multimedia network
APPLICATION DOMAIN	video-on-demand

FIG.57

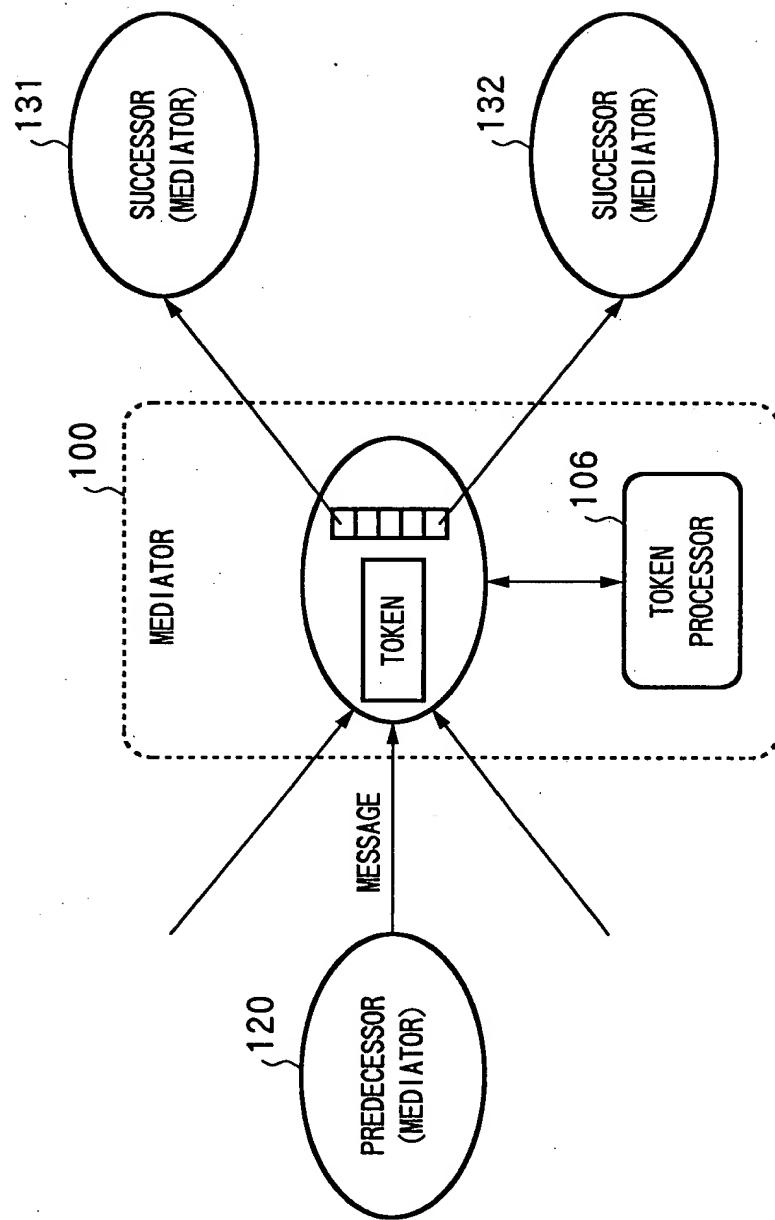
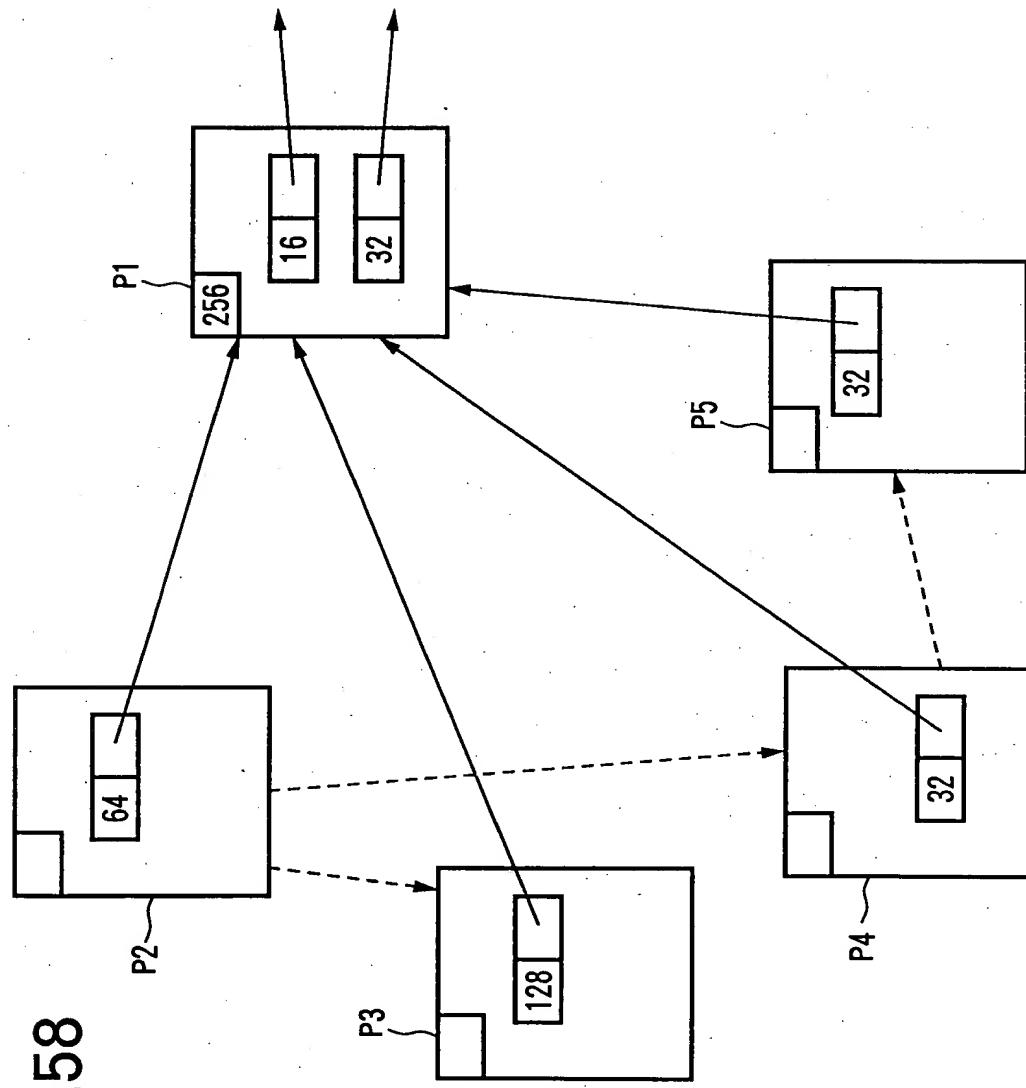


FIG.58



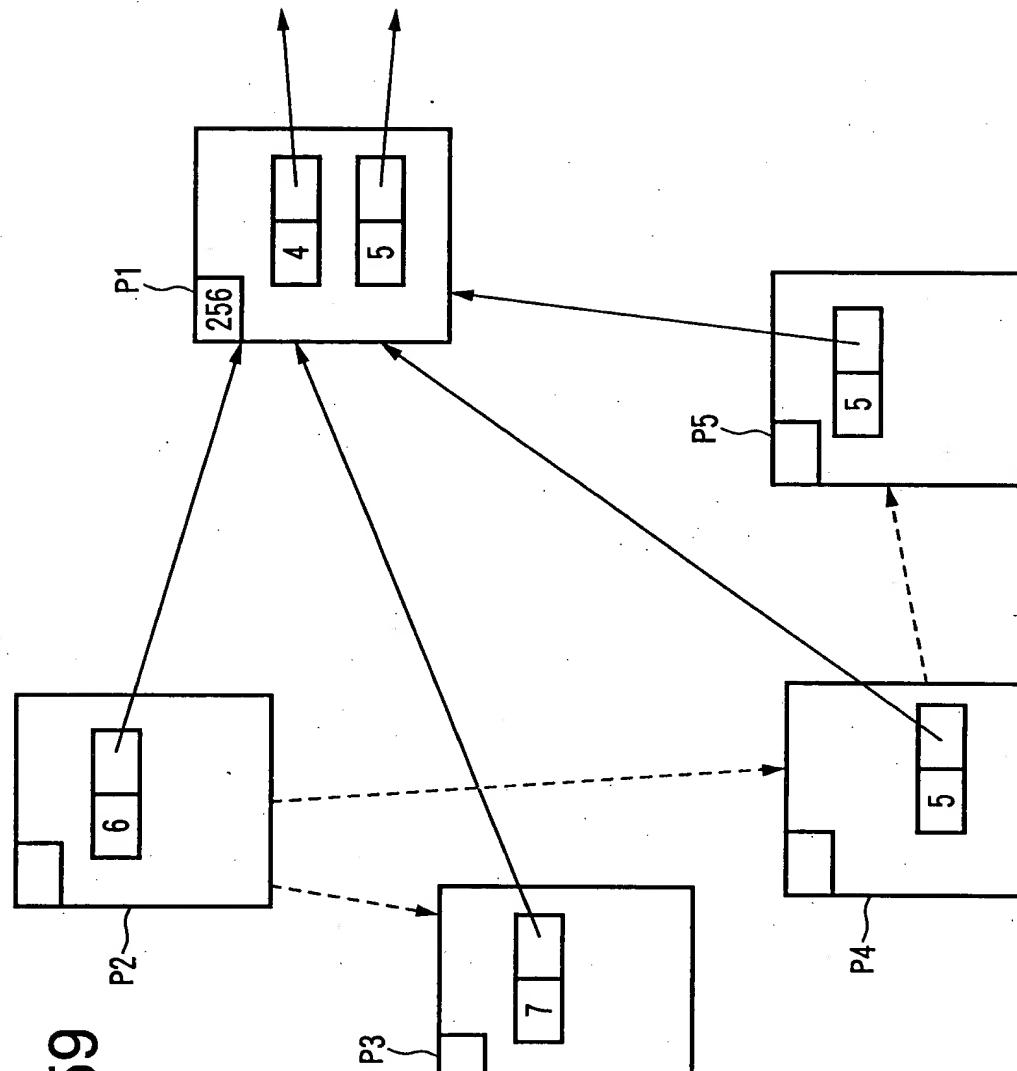


FIG.59

FIG.60

24, 855, 698, 147

```
18 net-resource://picture-server/picture11
42 net-resource://audio-server/audio11
33 net-resource://audio-server/audio12
47 net-resource://video-server/video11
31 net-resource://animation-server/animation11
57 net-resource://package-server/package2
54 net-resource://package-server/package3
58 net-resource://package-server/package4
55 net-resource://package-server/package5
49 net-resource://package-server/package6
```

PACKAGE BODY

FIG.61

```
<package>
<title format=DVL version=2.0>
<cover format=jpeg & cover-description />
<name>"FOO Movie Services:Star Wars Trilogy" </name>
<sort> CONTENT <minor-sort> MOVIE </minor-sort> </sort>
<system> PACKAGE-PROCESSOR </system>
<structure> <linkage> <local-link> & linkage-part </local-link> </linkage>
<content-attributes> <local-link> & content-attribute-part </local-link>
</content-attributes>
<control-attributes> <local-link> & control-attribute-part </local-link>
</control-attributes>
<sequences> <local-link> & sequence-part </local-link> </sequences>
</structure>
<!ENTITY cover-description {jpeg data body}>
</title>
```

FIG.62

```
<!ENTITY linkage-part
  <linkage>
    <link boundary=internal> <label> picture-link1 <label>
      net-resource://picture-server/picture31 </link>
    <link boundary=internal> <label> audio1-link1 <label>
      net-resource://audio-server/audio31 </link>
    <link boundary=internal> <label> audio1-link2 <label>
      net-resource://audio-server/audio32 </link>
    <link boundary=internal> <label> video-link1 <label>
      net-resource://video-server/video31 </link>
    <link boundary=internal> <label> package-link2 <label>
      net-resource://package-server/package2
        <content>
          <type> movie </type>
          <provider> FOO Movie Services </provider>
          <local-link> & content2 </local-link>
        </content>
        <control> admission-required </control>
      </link>
    <link boundary=internal> <label> package-link3 <label>
      net-resource://package-server/package3
        <content>
          <type> movie </type>
          <provider> FOO Movie Services </provider>
          <local-link> & content3 </local-link>
        </content>
        <control> admission-required </control>
      </link>
    <link boundary=internal> <label> package-link4 <label>
      net-resource://package-server/package4
        <content>
          <type> movie </type>
          <provider> FOO Movie Services </provider>
          <local-link> & content4 </local-link>
        </content>
        <control> admission-required </control>
      </link>
  </linkage>
```

FIG.63

```
<!ENTITY content-attribute-part
  <content-attributes>
    <type> movie </type>
    <provider> FOO Movie Services </provider>
    <date> 1 August 1997 </date>
    <items> 3</items>
    <material format=MPEG2> MOVIE </material>
    <content>
      &content1
      &content2
      &content3
      &content4
    </content>
  </content-attributes>
<!ENTITY content1
  <content>
    <title> Star Wars Trilogy </title>
    <type> Science Fiction </type>
    <rating authority=MPAA> PG </rating>
    <screenplay> George Lucas </screenplay>
    <starring> Mark Hamill </starring>
    <starring> Harrison Ford </starring>
    <starring> Carrie Fisher </starring>
  </content>>
```

FIG.64

```
<!ENTITY content2
  <content>
    <title> Star Wars </title>
    <length unit=minute> 121 </length>
    <year> 1977 </year>
    <review reviewer=Leonard Maltin> *** </review>
  </content>>

<!ENTITY content3
  <content>
    <title> Empire Strikes Back </title>
    <length unit=minute> 124 </length>
    <year> 1980 </year>
    <review reviewer=Leonard Maltin> *** </review>
  </content>>

<!ENTITY content4
  <content>
    <title> Return of the Jedi </title>
    <length unit=minute> 133 </length>
    <year> 1983 </year>
    <review reviewer=Leonard Maltin> *** </review>
  </content>>
```

FIG.65

```
<!ENTITY control-attribute-part
  <control-attributes>
    <billing amount=3000 currency=JPY> package-based </billing>
    <admitted-consumers>
      <certification> F00 Movie Customers </certification>
      </admitted-consumers>
    <access-conditions> parental-guidance </access-conditions>
    <execution-environment>
      </user-unit-requirement>
      <hard-drive-space> 40 </hard-drive-space>
      <memory-space> 8 </memory-space>
      <graphics> 640×480×16 </graphics>
      <audio> 16 </audio>
      <user-unit-requirement>
    </execution-environment>
    <encryption scheme=RSA key-sort=open> #87654321098765 </encryption>
  </control-attributes>>
```

FIG.66

```
<!ENTITY sequence-part
  <sequences>

  <!ENTITY picture1
    <picture hsize=300 vsize=200 color=256>
      <source> <local-link> picture-link1 </local-link> </source>
    </picture>

  <!ENTITY audio1
    <audio sampling-size=16>
      <source> <local-link> audio-link1 </local-link> </source>
    </audio>

  <!ENTITY audio2
    <audio sampling-size=16>
      <source> <local-link> audio-link2 </local-link> </source>
    </audio>

  <!ENTITY video1
    <video hsize=450 vsize=300 color=16 frame-rate=30>
      <source> <local-link> video-link1 </local-link> </source>
    </video>

  <!ENTITY dialog1
    <dialog>>
      <title> FOO Movie Services </title>
      <impose> <local-link> & content1 </local-link> </impose>
      Please Select Movie Title
      <action> take <local-link> package-link2 </local-link>
        "Star Wars"
      </action>
      <impose> <local-link> & content2 </local-link> </impose>
      <action> take <local-link> package-link3 </local-link>
        "Empire Strikes Back"
      </action>
      <impose> <local-link> & content3 </local-link> </impose>
      <action> take <local-link> package-link4 </local-link>
        "Return of the Jedi"
      </action>
      <impose> <local-link> & content4 </local-link> </impose>
    </dialog>
```

FIG.67

```
<!ENTITY viewer1
      <viewer min-hsize=440 min-vsize=330> </viewer>>
<open-window> & viewer1 </open-window>
<before delay=0 max-skew=500 duration=2> & picture1 & audio1 </before>
<while delay1=0 delay2=0 max-skew=80> & audio1 & video1 </while>
<before delay=0 max-skew=500> & audio1 & dialog1 </before>
<cobegin delay=0 max-skew=120> & audio2 & dialog1 </cobegin>
</sequences>

</package>
```

FIG.68

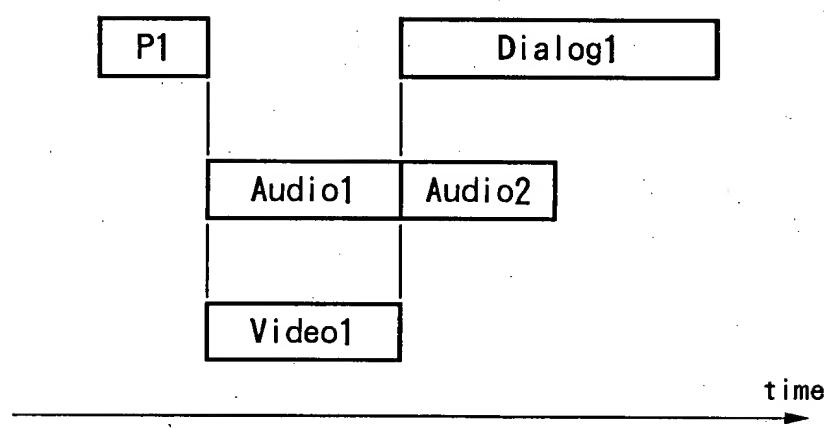


FIG.69

FOO Movie Services

title: Star Wars Trilogy
type: Science Fiction
rating: PG MPAA
screenplay: George Lucas
starring: Mark Hamill, Harrison Ford, Carrie Fisher

Please Select Movie Title

Star Wars

title: Star Wars
length: 121 minutes
year: 1977
review: **** Maltin

Empire Strikes Back

title: Empire Strikes Back
length: 124 minutes
year: 1980
review: *** Maltin

Return of the Jedi

title: Return of the Jedi
length: 133 minutes
year: 1983
review: *** Maltin

FIG.70

```
<package>
  <title format=DVL version=2.0>
    <cover format=text> Client Function Sample provided by
      DVL Package Processing Systems </cover>
    <name>"DVL:Client Function Sample" </name>
    <sort> PROGRAM <minor-sort> Microsoft Windows </minor-sort> </sort>
    <system> PACKAGE-PROCESSOR </system>
    <structure> <linkage> <local-link> & linkage-part </local-link> <linkage>
      <content-attributes> <local-link> & content-attribute-part </local-link>
        </content-attributes>
      <control-attributes> <local-link> & control-attribute-part </local-link>
        </control-attributes>
      <sequences> <local-link> & sequence-part </local-link> </sequences>
    </structure>
  </title>
  <!ENTITY linkage-part
    <linkage>
      <link boundary=internal> <label> server-link1 <label>
        net-resource://sever-systems/movie-server-manager </link>
      </link>>
    <!ENTITY control-attribute-part
      <content-attributes>
        <type> control-program <type>
        <provider> DVL Package Processor Systems </provider>
        <release> April 1997 edition </release>
      </content-attributes>>
    <!ENTITY control-attribute-part
      <control-attributes>
        <billing> free </billing>
        <execution-environment>
          </user-unit-requirement>
            <operating> Windows 95 </operating-system>
            <cpu-type-&-speed> Pentium 120 </cpu-type-&-speed>
            <hard-drive-space> 4 </hard-drive-space>
            <memory-space> 2 </memory-space>
            <user-unit-requirement>
          </execution-environment>
        </control-attributes>>
```

FIG.71

```
<!ENTITY sequence-part
  <sequences>
    <source-program language=C++type=header name="sample.hh">
      //-----
      // FILE: sample.hh

      PACKAGE(Client)      //DESIGNATE "Client" AS PACKAGE NAME

      class FOO {           //DEFINITION OF STRUCTURE TREATED AS
        public:              //MESSAGE ARGUMENT
          int i;             //INTEGER
          char * s;           //STRING
          double f;           //MULTIPLE PRECISION FLOATING NUMBER
        FOO() {               //CONSTRUCTOR
          i=0;
          s=NULL;
          f=0;
        }
      };
      PUBLIC class BAR { //DEFINITION OF DISTRIBUTED OBJECT "BAR" CLASS
        //BECOMES CLIENT OBJECT IN COOPERATION WITH SERVER OBJECT
        public:
          int pid;           //OBJECT IDENTIFICATION INTEGER VALUE
          RemoteInstance server; //REFERENCE OF SERVER OBJECT
          //CONSTRUCTOR : INVOKED BY CREATEOBJECT
          BAR(int id, RemoteInstance ri) {
            pid=id;
            server=ri;
          }
          //DEFINITION OF METHOD "bee" OF DISTRIBUTED OBJECT
          PUBLIC char * bee(int i, char * s, FOO * foo) {
            //SEND MESSAGE TO CALL METHOD "FEE::fea"
            //TO OBJECT server OF PACKAGE "Server"
            //ARGUMENTS ARE: pid, "ABC"
            void Send(server, "Server:FEE::fea", pid, "ABC");
            return "ABC";
          }
      };
    </source-program>
```

FIG.72

```
<source-program language=C++type=main name="sample.cc">
//-----
// FILE: sample.cc

#include "system.hh" //HEADER FILE OF DISTRIBUTED SYSTEM LIBRARY
#include "sample.hh" //HEADER FILE OF SAMPLE PROGRAM
#define SERVER "server-link1" //INDICATE REFERENCE OF LINK PART

main(void)
{
    //GENERATE INSTANCE OF CLASS "FEE" OF PACKAGE "server" IN
    //SERVER PROCESS (DESTINATION REFERENCE IS RESOLVED AT
    //LINK PART)
    RemoteInstance ServerObject =
        CreateObject(
            "Server:FEE", "SERVER"); //DESIGNATE LOCATION OF OBJECT
    //GENERATE INSTANCE OF CLASS "BAR" OF PACKAGE "client" IN
    //local PROCESS. AT THIS TIME, HAND REFERENCE OF
    //IDENTIFICATION INTEGER VALUE 1234 OF INSTANCE AND REFERENCE
    //OF SERVER OBJECT TO CONSTRUCTOR
    RemoteInstance ClientObject =
        CreateObject("Client:BAR", "local",
                    1234, ServerObject);

    //GENERATION AND INITIALIZATION OF STRUCTURE TREATED AS MESSAGE ARGUMENT
    FOO * foo=new FOO;
    foo->i=789;
    foo->s="DVL";
    foo->f=3.14;

    //SEND SYNCHRONIZATION MESSAGE TO CALL METHOD "bee", TO
    //OBJECT INDICATED BY ClientObject
    //ARGUMENTS ARE INTEGER VALUE 98765, STRING "abcdef"
    //AND STRUCTURE foo STRING.
    //AS A RESULT OF CALLING IS SUBSTITUTED FOR retVal
    char * retVal=SyncCall(ClientObject, "client:BAR::bee",
                           98765, "abcdef", foo);

    return 0;
}
</source-program>
</sequences>>
</package>
```

FIG.73

```
<package>
  <title format=DVL version=2.0>
    <cover format=jpeg> &cover-description </cover>
    <name> "F00 Movie Services:Service Manager Sites" </name>
    <sort> DOMAIN </sort>
    <system> PACKAGE-PROCESSOR </system>
    <structure> <linkage> <local-link> &linkage-part </local-link> </linkage>
      <content-attributes> <local-link> &content-attribute-part </local-link>
        </content-attributes>

      </structure>
    <!ENTITY cover-description {jpeg data body}>
  </title>
  <!ENTITY linkage-part
    <linkage>
      <link boundary=external> <label> server-link1 </label>
        net-resource://server-manager1/F00-movie-server-manager</link>
      <link boundary=external> <label> server-link2 </label>
        net-resource://server-manager2/F00-movie-server-manager</link>
      <link boundary=external> <label> server-link3 </label>
        net-resource://server-manager3/F00-movie-server-manager</link>
      <link boundary=external> <label> server-link4 </label>
        net-resource://server-manager4/F00-movie-server-manager</link>
      <link boundary=external> <label> server-link5 </label>
        net-resource://server-manager5/F00-movie-server-manager</link>
    </linkage>>
  <!ENTITY content-attribute-part
    <content-attributes>
      <type> server-manager
        <local-link> server-link1 </local-link>
        <local-link> server-link2 </local-link>
        <local-link> server-link3 </local-link>
        <local-link> server-link4 </local-link>
        <local-link> server-link5 </local-link>
      </type>
    <provider> F00 Movie Services </provider>
    <release> June 1997 </release>
  </content-attributes>>
</package>
```